

ORIP

Concept Clearance: New

Development of Resources and Technologies for Enhancing Rigor, Reproducibility, and Translatability of Animal Models in Biomedical Research

Objective: To support research and resource-related research projects aimed at developing broadly applicable technologies, tools, and resources for validating animal models and enhancing rigor, reproducibility, and translatability of animal research

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

Award Project Period: 2 to 5 years

Council Action: Vote for approval of the concept for “Development of Resources and Technologies for Enhancing Rigor, Reproducibility, and Translatability of Animal Models in Biomedical Research”



Background

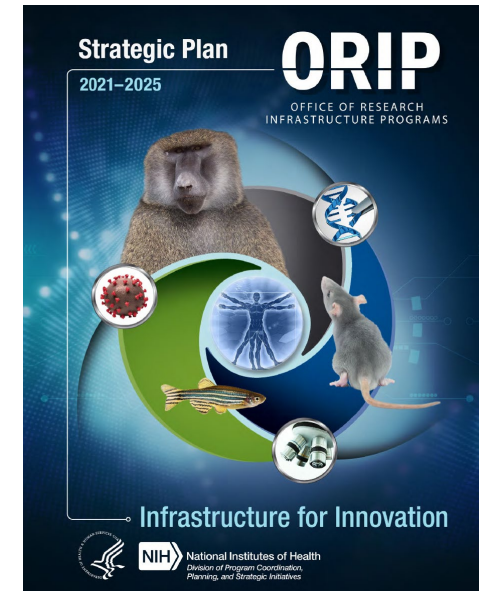
- **Animal models play essential roles in the discovery of basic biological mechanisms, understanding of the etiology of human diseases, and development of treatments**
 - Covid-19 vaccines and therapeutics
 - Diabetes drugs
- **Significant issues in preclinical research using animal models**
 - High irreproducibility of preclinical studies
 - High attrition rates of drug development



Background

ORIP Strategic Plan 2021-2025

- Facilitate the development and ensure the availability of the highest quality and most useful animal models and related resources for the advancement of research on human disease
- Improve and disseminate the best models for human conditions and diseases that are of interest to multiple NIH Institutes and Centers
- Advance the application of new technologies to support research resources and improve the generation, care, preservation, and distribution of animal models



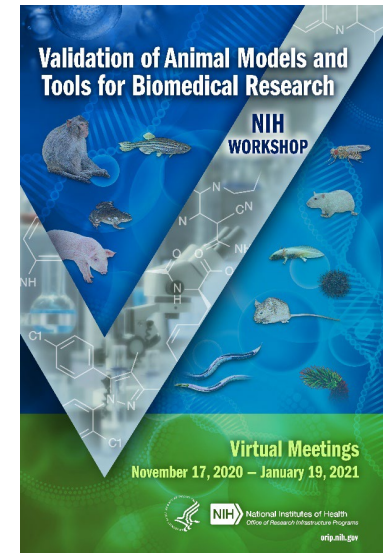
https://orip.nih.gov/sites/default/files/ORIP_Strategic_Plan_2021-2025_508.pdf



Background

Validation of Animal Models and Tools for Biomedical Research Workshop

- Organized by ORIP in collaboration with NHLBI, NIA, NIDDK, NIGMS, and NINDS as 10 virtual sessions in 2020 and 2021.
- Attendees included researchers in and outside of the United States as well as NIH program officials (200 to 500/session)
- Discussed the status and needs regarding the validation and rigor/reproducibility of animal models in biomedical research
- Topics included:
 - Validation of animal models (invertebrates to nonhuman primates)
 - Tools and resources needed for improving animal research
 - Strategies for predicting therapeutic outcomes
 - Integration of data for improving animal research



<https://orip.nih.gov/about-orip/workshop-reports>



Recommendations from the Workshop

- Improving genetic technologies for mutating and tagging genes, developing humanized animal models and nanoantibodies, detecting interacting proteins in cells
- Systematically phenotyping animal models at multiple levels (e.g., single-cell transcriptomics, proteomics, tissue, organ, cell morphology, metabolomics, behaviors)
- Screening technologies (i.e., high-throughput genetic and chemical screens)
- Artificial intelligence strategies that allow integrative mining of data in various databases (e.g., model organism databases, phenotype databases)
- Standardization and reporting of genetic background of strains, housing condition, and environmental conditions (i.e., to promote reproducibility)
- Sophisticated imaging facilities
- Enhancing stock centers



https://orip.nih.gov/sites/default/files/Validation_Session_X_Meeeting_Report_Final_508.pdf



NIH National Institutes of Health
Office of Research Infrastructure Programs

Purpose of the New Initiative

- **Support research and resource-related research projects aimed at developing broadly applicable technologies, tools, and resources for validating animal models and enhancing rigor, reproducibility, and translatability of animal research**
- **To align with ORIP's NIH-wide mission, proposed projects must:**
 - Have broad application to multiple NIH Institutes and Centers
 - Explore multiple body systems or evaluate diseases that impact multiple body systems
- **To align with ORIP's Strategic Plan, proposed projects must:**
 - Develop resources and technologies that have significant impact across a broad range of research areas using animal models
 - Demonstrate how proposed resources and technologies impact rigor and reproducibility of animal studies
- **In alignment with its mission, ORIP will seek input from NIH Institutes and Centers in addressing identified resource gaps and needs, including:**
 - Animal model validation technology, resource, and tool development
 - Artificial intelligence strategies
 - Deep integration



Examples of Suitable Projects

- Resources or technologies to facilitate phenotyping at multiple scales (single-cell, tissue, organ, whole organism)
- Technologies, including artificial intelligence tools, for integrating multi-omics, biochemical, physiological, morphological, and behavioral data
- Strategies that allow user-friendly informatic searches and integrative mining of data for comparative human-animal biology
- High-throughput imaging technologies for integrative analysis of cells and cellular networks across animal species
- Resources that facilitate collaborations between basic science and clinical researchers in the use of multiple animal models for studying human diseases (vertical integration)



Examples of Grant Mechanisms

Grant mechanisms to support this initiative could be, but are not limited to:

- R21 for 2-year exploratory/developmental research projects
- R01 for 5-year research projects
- R24 for 4-year resource-related research projects
- U24 for 4-year resource-related research projects under cooperative agreements
- Small business grant mechanisms



Concept Clearance

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for Enhancing Rigor, Reproducibility, and
Translatability of Animal Models in Biomedical
Research”***

