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NIGMS

**NIH** National Institute of  
General Medical Sciences



**Research Grant  
Opportunities at NIGMS:  
Strategies for Biomedical  
Research and Technology  
Development**



## Outline and Summary

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- NIH organization and extramural funding
- Contacting NIH staff during grant preparation
- Technology development at 3 NIH Institutes
- Grant funding opportunities and mechanisms
- Grant planning structure and evaluation
- Biomedical technology research and development stages



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**NIH** National Institute of  
General Medical Sciences

## NIH organization and extramural funding



## 27 Institutes and Centers (IC)



The NIH mission is to improve the health of the nation by conducting and supporting research:

- in the causes, diagnosis, prevention, and cure of human diseases.
- in the processes of human growth and development.
- in the biological effects of environmental contaminants.
- in the understanding of mental, addictive and physical disorders.
- in directing programs for the collection, dissemination, and exchange of information.

NCI	NEI	NHLBI
NHGRI	NIA	NIAAA
NIAID	NIAMS	NIBIB
NICHD	NIDCD	NIDCR
NIDDK	NIDA	NIEHS
NIGMS	NIMH	NIMHD
NINDS	NINR	NLM
CC	CIT	CSR
FIC	NCATS	NCCIH
OD		

Each Institute has different:

- Mission & priorities
- Budget
- Funding strategy
- Basic science support



## NIH Grants and Funding Guide

<https://grants.nih.gov/>

**National Institutes of Health**  
Office of Extramural Research

**Grants & Funding**  
NIH's Central Resource for Grants and Funding Information

Entire Site

[gRA](#)

HOME
ABOUT GRANTS
FUNDING
POLICY & COMPLIANCE
NEWS & EVENTS

Home » About Grants » How to Apply - Application Guide

### How to Apply - Application Guide

Use the application instructions found on this page along with the guidance in the funding opportunity announcement to submit grant applications to NIH, Prevention, the Food and Drug Administration, and the Agency for Healthcare Research and Quality.

**Prepare to Apply**

- Systems and Roles
- Register
- Understand Funding Opportunities
- Types of Applications
- Submission Options
- Obtain Software

**Write Application**

- Write Your Application
- Develop Your Budget
- Format Attachments
- Rules for Text Fields
- Page Limits
- Data Tables
- Reference Letters
- Biosketches

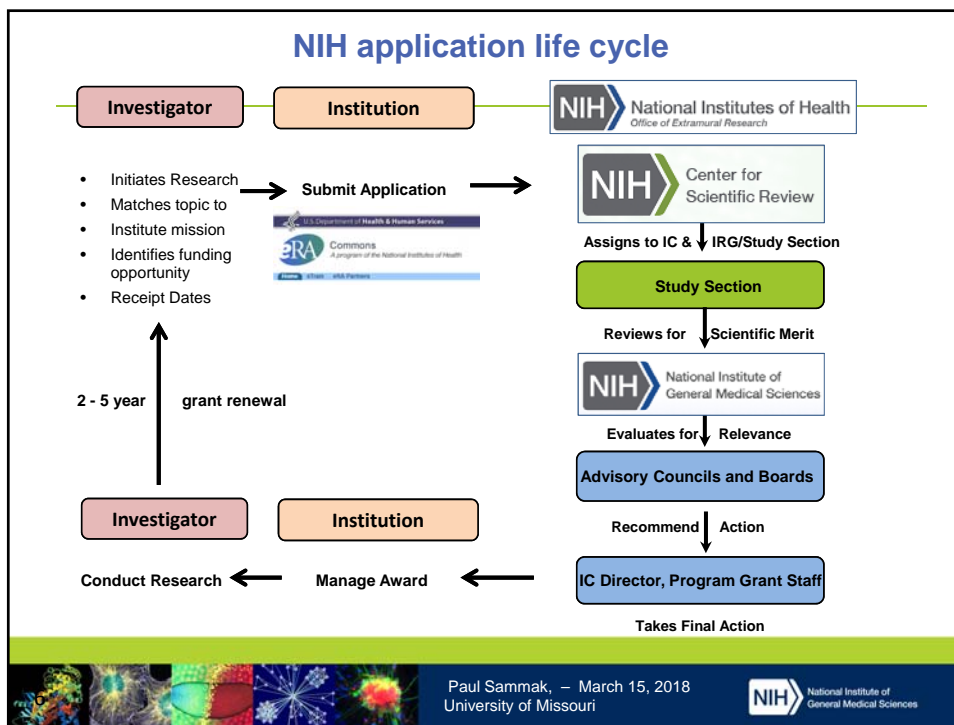
**Submit**

- Submit, Track, and View
- How We Check for Completeness
- Changed/Corrected Applications

Application Form Instructions

Need help selecting the right instructions?

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## The Center for Scientific Review Directs Applications to Institutes and Study Sections

<https://public.csr.nih.gov/StudySections/Standing>

[About CSR](#)
[Applicant Resources](#)
[Reviewer Resources](#)
[Study Sections](#)
[Rosters and Meetings](#)
[Employment](#)

[Integrated Review Groups](#)
[Standing](#)
[Small Business and Technology Transfer](#)
[Fellowship](#)
[Special Emphasis](#)

CSR Home > Study Sections > Standing

### Roster Index for Regular Standing Study Sections and Continuing SEPs

Share | X | Print

CMT	Cellular and Molecular Technologies	Cohen, Tatiana
EBIT	Enabling Bioanalytical and Imaging Technologies Study Section	Ryan, Kenneth
ISD	Instrumentation and Systems Development Study Section	Peterson, Joseph

Integrated Review Groups > Bioengineering Sciences and Technologies IRG [BST] > Instrumentation Study Section [ISD]

### Instrumentation and Systems Development Study Section [ISD]

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The Instrumentation and Systems Development Study Section (ISD) considers research applications seeking to design and develop instrumentation and systems for biological research. Applications driven by engineering principles and biological utility are typical. Applications need not be hypothesis driven.



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## Technology development at 3 NIH Institutes

- [National Institute of Biomedical Imaging and Bioengineering \(NIBIB\)](#) — Est. 2000
- [National Cancer Institute \(NCI\)](#) — Est. 1937
- [National Institute of General Medical Sciences \(NIGMS\)](#) — Est. 1962



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## Choosing the Right NIH Institute For New Technology

- Does Your Research Topic Match NIGMS?
  - The mission of NIGMS **includes** basic biological science for understanding principles and mechanisms in living organisms.
  - NIGMS research **does not** focus on disease or organ specific research which is supported in other NIH institutes.
- Technology Development at the NIGMS:
  - Innovative tools for basic biomedical research
  - Instruments, devices, algorithms and software, biological, chemical and physical tools for investigating or manipulating molecules and cells.
  - NIBIB supports bioengineering and imaging for the detection, treatment, and prevention of disease.



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## National Institute of Biomedical Imaging and Bioengineering (NIBIB)

HOME RESEARCH FUNDING LABS AT NIBIB TRAINING & CAREERS NEWS & EVENTS SCIENCE EDUCATION ABOUT NIBIB

Home

### ABOUT NIBIB

About NIBIB

Mission



- Techniques and devices to fundamentally improve the detection, treatment, and prevention of disease;
- Supporting related research in the physical and mathematical sciences;
- Supporting studies to assess the effectiveness and outcomes of new biologics, materials, processes, devices, and procedures;
- Developing technologies for early disease detection and assessment of health status;
- Developing advanced imaging and engineering techniques for conducting biomedical research at multiple scales.



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## Ongoing NCI Support for technology development

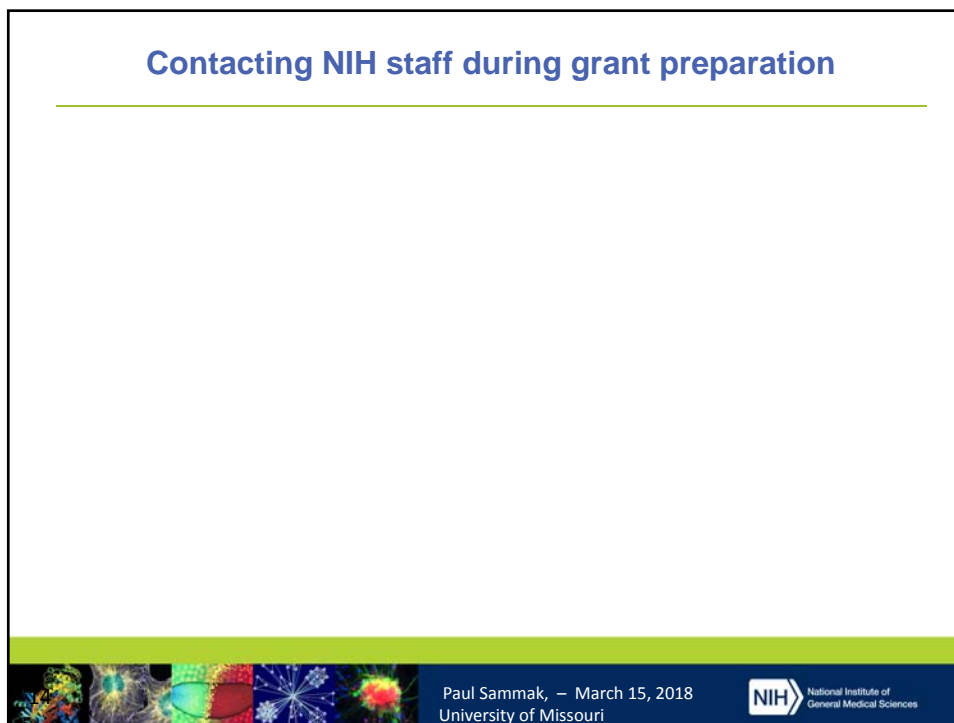
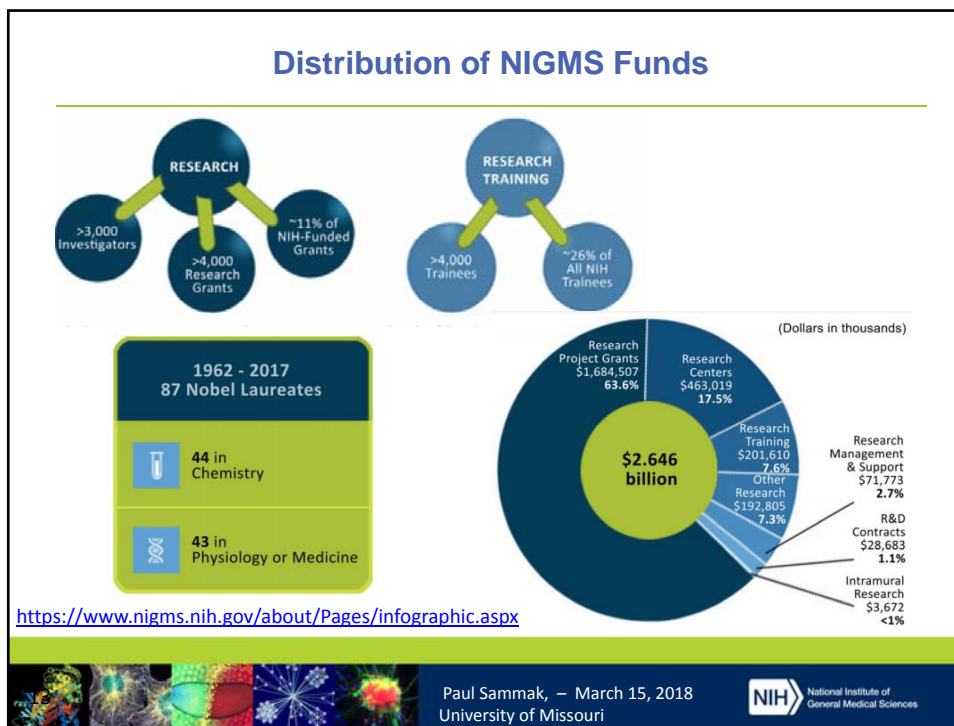
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## NIGMS Scientific Organization

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## Who should you talk to at NIH?

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- Program Officer (PO): Helps investigators apply for grants, interpret reviews, makes funding decisions, manages award in noncompeting years
- Scientific Review Officer (SRO): Refers application to appropriate study section, identifies and recruits reviewers, assigns reviewers to your application, runs the study section meeting, produces summary statement
- Grants Management Specialist (GMS): Handles financial aspects of the grant award, non-scientific issues such as PI effort, changes in animal/human subject use, etc.



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## When should you contact NIH staff?

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- Program Officer: Before you submit an application and after the summary statement is available, anytime after application is recommended for funding
- Scientific Review Officer: After you submit an application and before the summary statement is available
- Grants Management Specialist: After application is recommended for funding and anytime an administrative issue arises
- “Firewall” between Program and Review: POs do not review grants, SROs do not fund grants



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## What to talk about

- Program Officer:
  - Would your institute be interested in my research?
  - Is the scope/budget of my proposed work appropriate?
  - Questions about application/FOA-specific requirements
  - What is the best study section for my application?
  - Can you help me better understand the reviewer's comments?
  - What are my prospects for funding?
- In my experience, it's best to send an email first, which can lead to additional emails/phone calls
- If you are not contacting the right person, they will typically point you in the right direction



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## How to identify the right NIH contact

- Colleagues, friends, other researchers in your field
- Acknowledgements section of publications for funding agencies.
- Search NIH Institute/Center websites, e.g. NIGMS, NCI, NIBIB
- NIH RePORTER searches for matching grants, PIs, Program Directors (<http://projectreporter.nih.gov/reporter.cfm>)
- The Center for Scientific Review study sections and the application process (<http://public.csr.nih.gov/Pages/default.aspx>)
- All federal agencies reports <https://federalreporter.nih.gov/> (comprehensive, but not as current as NIH Reporter)



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## Search NIGMS web site for contacts

The screenshot shows the NIGMS website interface. At the top, there is a search bar and navigation links for 'Site Map', 'Staff Search', and 'My Order'. Below this is a main navigation menu with categories: NIGMS Home, Research Funding, Research Training, News & Meetings, Science Education, and About NIGMS. A central banner features 'Classroom Posters' with a 'More Info' button. To the right, a section titled 'I Want to Find Information for' lists various user groups like Scientists, Research Trainees, and Students. Below the banner, there are three main content areas: 'Scientific Programs & Contacts' (with a red circle around 'Contacts by Research Area'), 'Research in Progress' (listing 'Biomedical Beat Blog' and 'Findings Magazine'), and 'Feedback Loop Blog'. A 'NIGMS Strategic Plan 2015-2020' button is also visible. The footer includes the NIH logo and the text 'Paul Sammak, - March 15, 2018 University of Missouri'.

## NIH Reporter - find program officers, researchers, funded grants, publications

<https://projectreporter.nih.gov/reporter.cfm>

The screenshot displays the NIH Reporter (RePORT) website. It features a search bar at the top right and a navigation menu with categories: QUICK LINKS, RESEARCH, ORGANIZATIONS, WORKFORCE, FUNDING, REPORTS, and LINKS & DATA. The main content area is titled 'NIH RePORTER' and includes a 'CHECK OUT FEDERAL RePORTER' button. Below this, there are tabs for 'QUERY', 'BROWSE NIH', 'MATCHMAKER', and 'SEARCH PUBLICATIONS BETA'. A 'SUBMIT QUERY' button is present, along with a 'Fiscal Year (FY): Current FY is 2018' dropdown menu set to 'Active Projects'. The 'RESEARCHER AND ORGANIZATION' section contains input fields for 'Principal Investigator (PI) / Project Leader' and 'City', with instructions to use '%' for wildcards. The footer includes the NIH logo and the text 'Paul Sammak, - March 15, 2018 University of Missouri'.

## NIH Reporter Matchmaker identifies similar projects

Use your project text. Any text will do. Best text includes title, abstract, specific aims

[https://projectreporter.nih.gov/reporter\\_matchmaker.cfm?](https://projectreporter.nih.gov/reporter_matchmaker.cfm?)



## Match your text to existing NIH grants

Match Score	Project Title	Contact PI / Project Leader	Organization	FY	Admin IC	Funding IC	FY Total Cost by IC	Similar Projects
1204	EXTRACTING RICH INFORMATION FROM BIOLOGICAL IMAGES	GARPENTER, ANNIE	BROAD INSTITUTE, INC	2017	NIGMS	NIGMS	\$513,030	[Link]
840	COMPUTER INTEGRATED SYSTEMS FOR MICROSCOPY AND MANIPULATION (CISMM)	SUPERFINE, RICHARD	UNIV OF NORTH CAROLINA-CHAPEL HILL	2017	NIBIB	NIBIB	\$1,032,433	[Link]
822	TBD1	GRATTON, ENRICO	UNIVERSITY OF CALIFORNIA-IRVINE	2017	NIGMS		\$358,633	[Link]

The Matchmaker text base is the RCDC terms from title, abstract and aims for all grants since 2008. The best matched 100 grants are displayed



## Program officers with projects that match your text

**Matchmaker Results**

114 Program Official(s) from the matched projects. (500 projects maximum)

Click on chart labels to filter search results by the Institute/Center or Activity Code

**INSTITUTE/CENTER**

Institute/Center	Count
NCI	24
NIGMS	18
NIBIB	12
NHLBI	10
NINDS	10
NHGRI	8

**ACTIVITY CODE**

Activity Code	Count
R01	45
R21	12
R44	10
P01	8
U01	7
R25	5

Program Official	IC	Contact Information	Projects
SHIBESTARI, BEHROUZ	NIBIB	<a href="#">Click to view PO email address</a>	18
SAMMAK, PAUL J	NIGMS	<a href="#">Click to view PO email address</a>	16
TALLEY, EDmund M	NINDS	<a href="#">Click to view PO email address</a>	15
RAVICHANDRAN, VEERASAMY	NIGMS	<a href="#">Click to view PO email address</a>	12
HORSKA, ALENA	OD	<a href="#">Click to view PO email address</a>	12
GRABER, MARGARET C	NIBIB	<a href="#">Click to view PO email address</a>	10
LEVY, ABRAHAM	OD	<a href="#">Click to view PO email address</a>	9
KREPKOY, DMITRY	NIGMS	<a href="#">Click to view PO email address</a>	7
DEATHERAGE, JAMES F	NIGMS	<a href="#">Click to view PO email address</a>	6
BRAZNIK, PAUL	NIGMS	<a href="#">Click to view PO email address</a>	6

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## Search federal agencies:



**Federal RePORTER**

Project Search Results (1279)

Missouri (176)

Name	Project Number	Contact By	Organization	PI Role	Start
INNOVATING AS A THERAPEUTIC APPROACH TO CANCER METASTASIS	5R01CA19174-01	CEL, JENNIFER	BRANDISHER UNIVERSITY	PI	\$75,004
NOVEL BI-FUNCTIONAL CHEMICAL AGENTS AS THERAPEUTIC TOOLS FOR AMYLOID DISEASES	5R01NS10169-01	MIRAL, LUIS M	BRANDISHER UNIVERSITY	PI	\$28,750
ADDITIONAL TO PREVENT RECURRENT WHEEZING FOLLOWING SEVERE RSV BRONCHIOLITIS	5R01HL12674-01	WILLIAMS, ANDREW	BRANDISHER UNIVERSITY	PI	\$19,800
STRUCTURES OF MEMBRANE ROUND AND INGESTED TETRAUS TORN	5R01NS10169-01	BALZONA, MICHAEL R	UNIVERSITY OF MISSOURI-COLUMBIA	PI	\$4,847

- <https://federalreporter.nih.gov/>
- Find local collaborators
- Find overlapping projects
- Find research topic distribution



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## Grant funding opportunities and mechanisms

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## It's not a Grant...it's an Application

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- It is not a grant until you get the Notice of Grant Award...your job is to figure out how to get one!
- First figure out what you really want to do...and why!
- Learn all about the NIH system.
- Then adjust your expectations to match reality.
- Write an abstract and draft specific aims and then seek advice...mentors, program staff, your grandmother.
- Shop it around the NIH...where does this really belong?
- Find the appropriate FOA and follow the instructions!



## Types of funding for your work

- Fellowships (F awards): individual awards for predoctoral and postdoctoral training
- Career Development (K awards): individual awards for senior postdocs or faculty to promote mentored, targeted career development
- Training grants (T awards): institutional awards to support predoctoral and/or postdoctoral training
- Research grants (R awards): support individual or group research projects, LOTS of different types



## Research grant mechanisms at NIGMS

- [Research Project Grants \(R01\)](#)
  - Research project grants to support a discrete project
- [Academic Research Enhancement Awards \(AREA\) \(R15\)](#)
  - AREA awards for small-scale projects at Institutions with less than \$6M NIH funds
- [Maximizing Investigators' Research Award \(MIRA\) \(R35\)](#)
  - MIRA funds investigators rather than projects and provides greater flexibility
  - [Exploratory/Development Grants \(R21\)](#)
  - Technology Development only
- [Small Business Innovation Research \(SBIR\) Program \(R43/44\)](#)
  - Grant from business with university collaboration possible
- [Collaborative Program for Multidisciplinary Teams \(RM1\)](#)
  - Team science projects 3-6 investigators



## R01 research project grants (R01)

- Largest category of funding provided by NIGMS.
- Discrete project related to the investigator's area of interest and competence (12 pages).
- Single or Multiple Program Director/Principle Investigator
- Provides funds for reasonable costs of the research activity, salaries, equipment, supplies, travel and other related expenses.
- Common modular budget is \$250,000 for 4 years (5 years for early stage or new investigators).



## R21 Exploratory/Developmental Research Grants

- Provides support for the early stages of project development.
- Pilot and feasibility studies.
- No preliminary data is generally required (varies).
- Limited to up to two years of funding.
- Direct costs for the two year project period is \$275k.
- 6 Page Research Strategy.
- Not all Institutes Participate.
- NIGMS has a Technology Development R21 announcement.



## Small business innovation research (SBIR) program (R43/44)

- Increase private sector commercialization of innovations derived from federal research and development.
- Stimulate technological innovation to benefit the broader research and development communities.
- Phase I (R43) establishes the scientific and technical merit, feasibility and commercialization potential.
- The Phase II grant (R44) continues research and commercial development initiated in Phase I.
- With justification, budgets up to \$225,000 for Phase I and \$1,500,000 for Phase II, (a hard cap).



## Academic Research Enhancement Awards (AREA) (R15)

- Support meritorious research [NIGMS AREA \(R15\)](#).
- Strengthen research environment of schools with less than \$6M NIH research funds.
- Expose undergraduate, graduate students to meritorious research
- Overall impact of R15 differs from R01.
  - Make an important scientific contribution, not required to exert a sustained powerful influence
  - Quality of student involvement is required





## Maximizing Investigators' Research Award NIGMS MIRA (R35)

- Goal is to fund investigators rather than projects.
- Provide increased stability, flexibility, and wider distribution of funds.
- One NIGMS grant per PI – 51% of *research* effort required
- Larger and longer (5 years) than current R01 averages
- Direct cost: \$250k for ESI, Up to \$750K for Established Investigator
- Not tied to project specific aims (No specific aims page)
- Review based on track record, service, and overall research ideas
- Plan is for renewals to promote stability (success rate and bridging)



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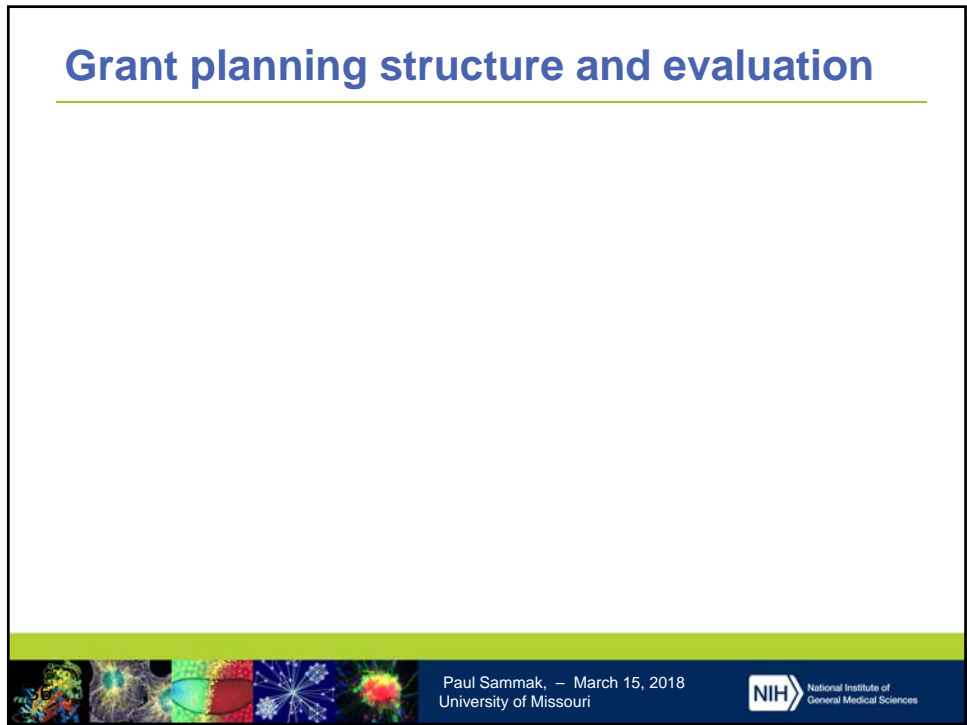
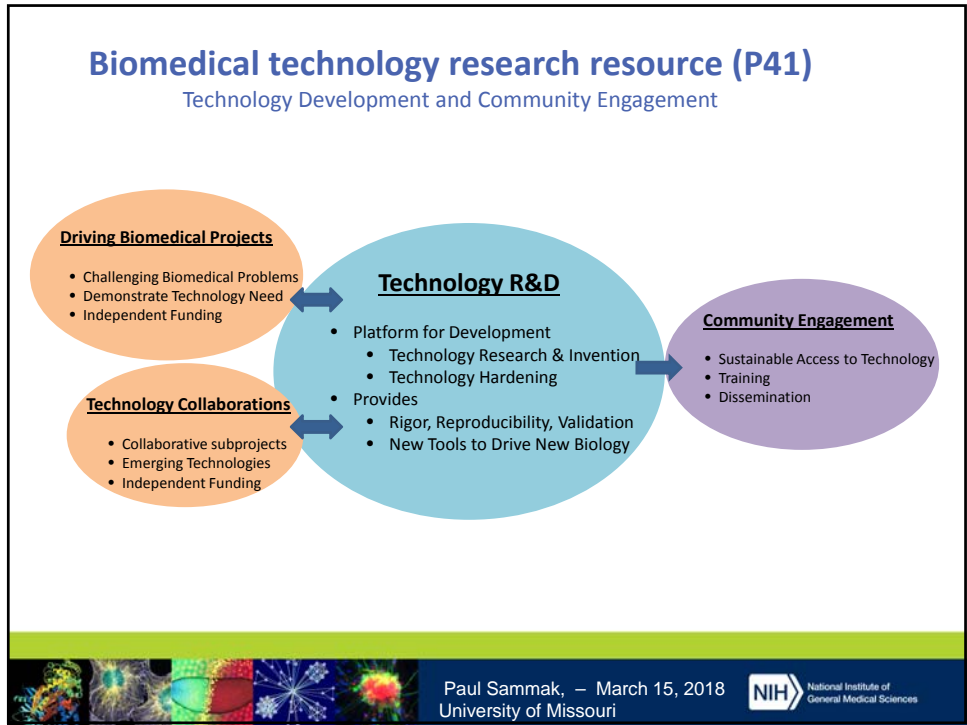
## Team Science: Collaborative Program for Multidisciplinary Teams (RM1)

- Significantly Complex Basic Biomedical Problem [PAR-17-340](#)
  - Far-reaching objectives that will produce major advances in the field.
  - Ambitious and challenging research requiring many points of view to solve.
  - Biomedical research topics contained within the mission of NIGMS.
  - Main focus cannot be community resources, or technology development
  - Direct costs \$700,000 to \$1,500,000/yr for 5 years.
- Interdisciplinary Team Science
  - Objectives should not be achievable with a collection of individual projects.
  - Highly integrated research teams of three to six PD/Pis.
  - Detailed team management plan defines responsibilities and interactions.
  - Pilot studies for Early Stage Investigators (ESIs), \$250,000/yr for 4 years.



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## Choosing the right project

- Is Your Research Topic Compelling?
  - Reviewers need to agree this must be done. Not just interesting to you.
  - Critical time to do this for the field. Project stage not too early or too late.
- Does Your Research Topic Match Your Expertise?
  - Training. Track record. Preliminary data.
  - Personal Statement in Biosketch explains your particular set of skills.
- Collaborators add needed skills.
  - Budget justification to explain need for equipment material and collaborators.
- Letters add weight and explain exact roles of collaborators/supporters.
  - Demonstrate breadth of interest and importance of the project.
  - Collaborator commitment, but **no** preliminary data.



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## Logic for solving problems

- Objective – how much to accomplish in 4-5 years?
  - Would the increment accomplished during the project advance state-of-the-art in a significant way?
  - Scope of project should be a substantive advance but not overly ambitious.
  - Objectives should be grounded in an achievable work plan.
  - Objectives further biomedical knowledge or human health (don't overreach)
- Specific Aims – questions/hypotheses connect work plan to objectives
  - Aim towards intelligent, non-expert reader. Good writing. Limit jargon.
  - Quantitative to establish correlation, but don't stop here. Look for causation.
  - Each aim should be necessary and sufficient to achieve objectives.
  - Aims are questions. Work plan provides answers.
  - Rigorous logic, data treatment and interpretation.



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## Work plan for solving problems

- The premise is the starting point
  - The premise is current state of knowledge - publications and preliminary data.
  - Preliminary data establishes expertise, project feasibility and key obstacles.
- Each aim is a component of the objective and explains how achieving milestones accomplishes project goals.
  - Logical, Comprehensive, identify key obstacles, how data is to be interpreted.
  - Appropriate methods and technical expertise.
  - Milestones – what, how much, by when.
  - Criteria for success - quantitative statistical end points to determine whether goals have been achieved or not.
  - Key obstacles and risks managed with alternate approaches.



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## Reviewer evaluation of R01 grant applications

- *Enthusiasm = Significant Problem + Innovative Work Plan + Broad Solution*
- Starting Point (Premise)
  - Published work + Preliminary data.
  - Defines an unsolved problem and establishes a need.
- End Point - Importance to others (Significance)
  - If achieved would the objectives solve an important problem or a critical barrier?
  - How would concepts, methods, technical capability be improved?
- Work Plan – sufficient to move from starting to ending point (Approach)
  - Logical strategy, methods, and analysis to accomplish the specific aims.
  - Scientific rigor, statistical methods, alternative strategies, and benchmarks for success, risk management.



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## Formal review criteria for R01 grant applications

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- Scientific and technical merit of all NIH applications are peer reviewed.
  - *Overall Impact = (Significance + Feasibility)*
- Scored Review Criteria
  1. Significance
    - strong scientific premise, important problem or a critical barrier
    - How will concepts, methods, technical capability be improved?
  2. Investigator(s)
    - Are investigators well suited to the project?
    - ongoing record of accomplishments



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## Formal review criteria for R01 grant applications

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3. Innovation
  - Challenge and seek to shift current research.
  - Use novel theoretical concepts, approaches methods, instrumentation.
4. Approach
  - Logical strategy, methods, and analysis to accomplish the specific aims
  - Scientific rigor, statistical methods, alternative strategies, and benchmarks for success, risk management.
5. Environment.
  - Adequate institutional support, equipment and resources.
  - Unique features of the scientific environment.



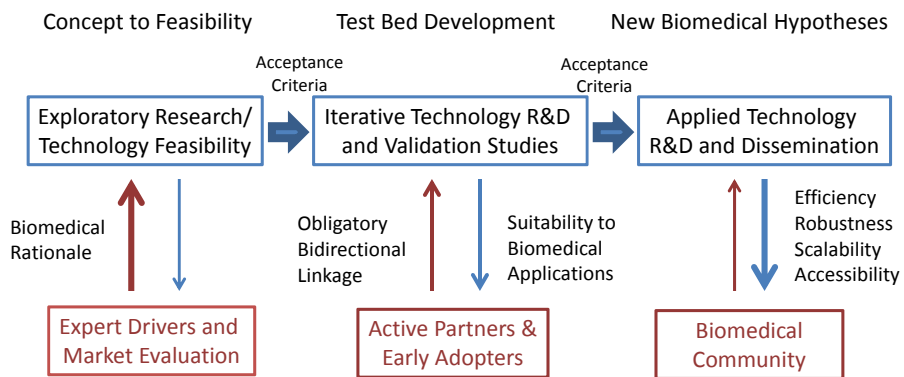
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## Biomedical technology research and development stages



## Biomedical technology research and development stages



## Choosing the right grant for new technology

- **R21: Exploratory **concept** through feasibility testing** [PAR-17-046](#).
  - High potential, high risk, but untested concepts are evaluated for feasibility.
  - Propose an important advance over state-of-the-art. No unpublished data.
  - Include validation plans but no new biological hypotheses.
- **R01: Focused technology **research** and development** [PAR-17-045](#).
  - Preliminary data demonstrates feasibility of the approach.
  - Innovative work plan solves technical obstacles for effective research tools.
  - Include biological validation plans but no new biological hypotheses.
- **Parent R01: **Iterative** testing of technology and biology** [PA-18-484](#).
  - Tools are extended and used to solve unknown biological questions.
  - Biology requires new tools. Tool development is driven by biology.



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## Long-term path for technology developers

- **R21 Concept through Feasibility**
  - One time, not renewable. 2 years + no cost extension
- **R01 Focused Technology Development**
  - Renewable once. 8 years + no cost extension NI/ESI option
- **R01 Parent Iterative testing of technology and biology**
  - Renewable. No limit. Broad guidelines on topic. NI/ESI option
- **R35 MIRA ESI option**
  - Career program including NIGMS technology. Long term, stable.
- **R43/R44 SBIR/STTR**
  - Small Business commercial product development Phase I/II. 2 years
- **P41 BTRR**
  - Biomedical Technology Research Resource. Technology research 15 years



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Thank you

