

Department of Health & Human Services National Institutes of Health

ASEE ERC workshop Bioengineering training and research support from NIH

March 5, 2012

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Topics for today

- NIH overview
- Training opportunities
- Research opportunities
- References and links

The Broad Reach of the NIH



NIH *is* an institution (Intramural Research)

~ 6,000 scientists ~ 10% of NIH budget FY 2005 NIH Extramural Grants by Research Institution



NIH supports institutions & people (Extramural Research)

- > 4,000 institutions
- > 300,000 scientists & research personnel
- ~ 85% of the NIH budget

NIH Grant Statistics

Fiscal Year 2010

- 88,000 applications received (all mechanisms)
- 240 Review Officers organized 1,600 meetings with 18,000 reviewers
- Over 62,000 research grants reviewed







NIH is organized into:



MEDICINE MEDICINE National Human Genome Research

Institute

NATION

National Institute

of Mental Health

NATIONAL INSTITUTE OF NEUROLOGICAL Disorders and Stroke

center for scientific review

Center for Information Technology NIAMS Clinical Center

National Institute of Arthritis and Musculoskeletal and Skin Diseases



NATIONAL INSTITUTE ON AGING National Institutes of Health

NIH FY10 Budget

NIH Divides most of its investment according to the interests of the component parts (i.e. Institutes or Centers), with <4%) allocated to trans-NIH initiatives.



Research Project Grants (RPGs): The Mainstay of NIH Sponsored Research



Research Project Grants (RPGs) include R00, R01, R03, R15, R21, R22, R23, R29, R33, R34, R35, R36, R37, R55, R56, RL1, RL5, RL9, P01, P42, PN1, UC1, UC7, U01, U19, U34, DP1, DP2, RL1, RL2, RL5, RL9. More info available at: http://www.report.nih.gov

Research Project Grants (RPGs) Size



•Research Project Grants (RPGs) include R00, R01, R03, R15, R21, R22, R23, R29, R33, R34, R35, R36, R37, R55, R56, RL1, RL5, RL9, P01, P42, PN1, UC1, UC7, U01, U19, U34, DP1, DP2, RL1, RL2, RL5, RL9. More info available at: http://www.report.nih.gov

NIH Funding Supports Scientists at Every Career Stage



TRAINING

Team-Based Design Projects (R25)

- Capstone **design** courses at BME departments
 - **Open-ended** biomedical **design** projects
 - Team-based approach
- Clinical immersion
- Emphasize translation of biomedical devices, including industrial design, regulation and commercialization concepts
- New or existing programs
- \$20k for parts and supplies, machining, didactic development, speaker expenses, patent searches, etc
- \$20k for student stipends only for programs with a clinical immersion period in the summer

http://grants.nih.gov/grants/guide/pa-files/par-10-140.html



National Institute of Biomedical Imaging and Bioengineering



Design by Biomedical Undergraduate Teams (DEBUT) Challenge

- Open to <u>undergraduate students</u>
- Team-based design projects in three categories:
 - Diagnostic Devices/Methods
 - Therapeutic Devices/Methods
 - Technology to Aid Underserved Populations and Individuals with Disabilities.
- □ Winners in each category receive:
 - \$10,000 prize
 - Up to <u>\$2,000 in travel costs</u> to attend award ceremony at BMES Annual Meeting

Entry deadline: May 26, 2012; Winners announced: July 31, 2012 <u>http://debut.challenge.gov/</u>



National Institute of Biomedical Imaging and Bioengineering



Institutional Training

Disciplinary



Multidisciplinary





Interdisciplinary



Integrative Program in Complex Biological Systems (UCSF)

UCCE University of California, San Francisco

This HHMI-NIBIB Interfaces Program, using Boot Camps in computation and molecular biology and eam Challenges in biomedical imaging, molecular biology, and systems biology, trains students in the understanding and engineering of complex biological systems from the molecular to the organismal level.

<u>Challenge 1</u> – <u>Design and build</u> a fluorescent microscope from component parts, using it to analyze an unknown spectrum.

Challenge 2 – Given a set of yeast samples, deduce what molecular perturbation occurred prior to their demise, constructing genomic microarrays and using bioinformatic tools.

<u> Challenge 3</u> - Design a novel synthetic biological behavior using literature-derived genetic elements and specifying the system at the DNA level.







Biomedical Imaging and Informational Sciences (UPenn)



This HHMI-NIBIB Interfaces program, *by integrating medical* school and imaging coursework and dually mentoring students with basic and clinical mentors, produces translational scientists who understand the medical basis of disease and have the technological know-how to develop new imaging methods for detection, diagnosis, and treatment.

Howard Hughes Medical Institute (HHMI) and National Institute of Biomedical Imaging & Bioengineering (NIBIB) Interfaces Initiative at the University of Pennsylvania

> BIOMEDICAL IMAGING & INFORMATIONAL SCIENCE HHMI INTERFACES SCHOLARS









Penn's new PhD training is an immersion program that vertically integrates diadcic and laboratory work in biomedione with quantitative imaging science by combining intensive medical school course work with workf-class imaging science training and research. HHMI (Interfaces Scholars in this highly selective program may obtain their PhD in any of the cutting edge areas of biomedical image science.

Students with a strong quantitative background in basic or applied sciences who wish to develop these skills in imaging sciences whilst simultaneously acquiring a formidable knowledge base in biomedicine should apply.

Course information (including the background of the 2007 Scholars) at www.uphs.upenn.edu/imelphdprogram/home.html Trainees supported by the HHMI and NIBIB





National Institute of Biomedical Imaging and Bioengineering

Research Education Programs for Residents and Fellows (R25)

Integrates education programs of Radiology and other clinical departments and supports residents and fellows in radiology and other NIBIB-relevant residency programs as clinician-scientists.

- Parent program based in radiology department.
- Program participants from radiology and other residency programs, including cardiology, neurology, oncology, orthopaedics, ophthalmology, and surgery.
- □ 12 or 24 month support
- □ >75% effort
- □ \$70k/participant, \$10k expenses, \$1k travel
- 2 participants/yr





New and Early-Stage Investigators

New Investigator – Applicant has not previously been a PD/PI on a significant NIH independent research award.

Early-Stage Investigator - New Investigator within 10 yrs of completing their terminal degree or medical residency.

Peer reviewers will focus more on the approach of early-stage investigators than their track record and expect less preliminary data

NIBIB Edward C. Nagy New Investigator Policy

- 5 % payline relaxation for New Investigators
- Only for R01 applications







Career Development Programs

Mentored support for basic and clinical investigators who are transitioning to independence, changing their research focus, or need protected research time.



- □ K99/R00 Pathway to Independence Award
- K01 Research Scientist Development Award
- K25 Quantitative Scientist Development Award
- K08 Clinical Scientist Development Award
- K23 Patient-Oriented Development Award

Receipt Dates: Feb/June/Oct 12 (Mar/July/Nov resubmissions)

K Kiosk: http://grants1.nih.gov/training/careerdevelopmentawards.htm









Pathway to Independence Program (K99/R00 - Kangaroo Award)

- US citizen/permanent residents or non-citizens on visas
- No more than 5 years of postdoctoral experience
- Must be in dependent position

K99 Dependent Phase

- 1-2 yrs mentored postdoctoral support
- \$50K salary, \$20K research costs + 8% F&A

R00 Independent Phase

- 3 yrs -- contingent upon securing an independent research/faculty position
- \$249/yr total cost with full F& A







Pathway to Independence Program (K99/R00 - Kangaroo Award) – cont.

- NIBIB committed to 5 K99/R00 awards/yr
- 23 awards since 2007
- 9 successful transitions to R00 phase

Matthew J Allen, PhD

Assistant Professor Department of Chemistry, Wayne State University

"Increasing the Utility of Contrast Agents for MRI"









NIH Director's Early Independence Award (DP5)

- Inspired by programs at Carnegie, UCSF, Whitehead, and other institutions.
- Helps exceptional MDs/PhDs <u>omit traditional postdoctoral</u> <u>training</u> and move directly into mentored research positions.
- Reduces the time it takes young scientists to launch independent research careers.

Receipt date: January 30, 2012







National Institute of Biomedical Imaging and Bioengineering



Mentored Quantitative Research Development Award (K25)

- Early-career investigators with quantitative backgrounds who are changing their focus to biomedical research.
- Quantitative (e.g., mathematics, statistics, economics, computer science) and engineering backgrounds

Brian S Caffo, PhD

Associate Professor Department of Biostatistics, Johns Hopkins University "<u>Mentored Training Program in Quantitative</u> <u>Medical Imaging</u>"









Research Scientist Development Award (K01)

- Early-career investigators with quantitative backgrounds who are transitioning to research independence
- **Career path redirection** or other institutespecific requirement may apply– check with Program Director before preparing application



Ann-Marie Broome, Ph.D.

Research Assistant Professor Case Western Reserve University

"Imaging Complex Molecular Signatures in Cancer"







RESEARCH



HHMI-NIBIB Public Forum

DMR measurements

NIBIB RO1 Weissleder: Molecular Analysis of Cells at the Point-of-Care

1. Sample collection

3. On chip measurement



Nature Nanotech. 2010;5(9):660-5

Saturation magnetization (kA/m)

World smallest NMR

NIBIB RO1 Weissleder: Molecular Analysis of Cells at the Point of Care



Game changing technology

Ca Dx: DMR Accuracy 96% vs Biopsy Accuracy 84%





Friday, August 26, 11

Bioengineering support at NIH

- FY 2010 \$3,166M
- Examples:
 - NIGMS 'Implantable Sensor for Transplant Tissue Monitoring'
 - NHLBI 'Pediatric Cardiac Monitor for Extracorporeal Life Support'
 - NINDS 'Development and Early Clinical Evaluation of Noninvasive MRI Measurement of ICP '

<u>R01</u> Percentiled Applications Cumulative <u>Count</u> at Each Percentile January Councils (2009-2012)



SBIR/STTR Program Reauthorization Signed December 31, 2011

- Reauthorizes the SBIR/STTR programs for 6 years through FY 2017
- Most significant change to programs since their inception



Key Reauthorization Provisions

1. Set aside requirements for Agencies will increase

| FY | Set-aside SBIR | Set-aside STTR |
|----------------|----------------|----------------|
| 2011 (current) | 2.5% | 0.30% |
| 2012 | 2.6% | 0.35% |
| 2013 | 2.7% | 0.35% |
| 2014 | 2.8% | 0.40% |
| 2015 | 2.9% | 0.40% |
| 2016 | 3.0% | 0.45% |
| 2017 | 3.2% | 0.45% |

Key Reauthorization Provisions

2. Guidelines for Size of Awards

| Program | Phase I | Phase II | Current |
|---------|-----------|-------------|-----------|
| SBIR | \$150,000 | \$1,000,000 | 150K/1M |
| STTR | \$150,000 | \$1,000,000 | 100K/750K |

3. Hard Limits* on award size to 50% over guidelines

| Program | Phase I | Phase II | Current |
|---------|-----------|-------------|----------|
| SBIR | \$225,000 | \$1,500,000 | Flexible |
| STTR | \$225,000 | \$1,500,000 | Flexible |

* Waiver possible for Specific Topics from Sm Buss Adm

Key Reauthorization Provisions

4. Venture Capital Participation expanded

up to 25% (other agencies 15%) of SBIR funds to SBCs majority owned by multiple VCs, hedge funds, or private equity firms

5. Technical Assistance programs

Both SBIR and STTR increased to \$5,000 per Phase I and II award per year (previously limited to SBIR-only \$4,000)

Who are you going to call?

- Web based information
- Scientific program staff at research institutes and centers



cess_rates/index.aspx

What Does NIH Already Support in My Interest Area?



http://report.nih.gov/index.aspx

NIH Searchable Databases Contain Abstracts of All Funded Projects

| 1 | U.S. Department of Healt | h & Human Services | | | | www.hhs.go |
|------|--|---|------------------------|---|------------------------|--------------------------------|
| | Research Portfolio O Reports, data and analyses | TH Online Reporting Tools (RePORT) OF NIH RESEARCH ACTIVITIES | | S | earch by MESH terms | ESULTS (RePORTER |
| | HOME FREQU | ENTLY REQUESTED REPORTS REPORTS | CATEGORICAL SPEN | | Kannanda | LINKS |
| Home | > <u>RePORTER</u> > Query Form | | | | Key words | 1 <u>Register</u> Font Size: |
| | Reporter | 10/19/10 Release Note: New enhancements no View <u>Release Notes</u> for more information. | ow available. | • | Organizations | DRTER ROPORTER MANUAL |
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| 🕹 NIH Grant Review Process YouTube Videos - Mozilla Firefox | | | | | |
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| national institutes of health | ● home ● contact csr ● staff directory | | | | |
| center for scientific review | search Enter keyword(s) (30) | | | | |
| Home > Resources for Applicants | | | | | |

NIH Grant Review Process YouTube Videos

CSR has produced a series of videos to give you an inside look at how scientists from across the country review NIH grant applications for scientific and technical merit.

New and established applicants will find insights and understanding that can empower them to improve the applications and increase their chances for receiving a more positive review.

printer friendly

You Tube NIH Peer Review Revealed...

national institutes of health

http://cms.csr.nih.gov/ResourcesforApplicants/ InsidetheNIHGrantReviewProcessVideo.htm

Peer Review and You

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| National Institutes of Health | | | Employee Info Staff Directory En Españ |
| | | | search |
| | HOME HEALTH GRANTS NE | WS RESEARCH INSTITUTES ABOUT NIH | >> Advanced Search |
| | Peer Review Home | | Email this page |
| | Enhancing P | eer Review at NIH | |
| | Peer Review Home | Overview | |
| | Implementation Goals Engage the Best Reviewers | The National Institutes of Health (NIH) has a longstanding history of supporting the most promising and meritorious research. The increasing breadth, complexity, and interdisciplinary nature of modern research has necessitated a more formal review of the NIH | Read about shortened and restructured application forms and instructions. |
| | Improve the Quality & Transparency of Review Ensure Balanced and Fair Reviews | peer review system. In March 2008, the NIH announced the end of a year-long diagnostic phase and release of the final report. The report identified the most significant challenges and proposed recommendations that would enhance the peer review system. | Latest News Application Changes Announced (9/16/09) Need Help Interpreting the New Review |

Continuous Review of Peer Review

Policy Announcements

Fund the best science, by the best scientists, with the least amount of administrative burden.

Phases of Process

- Need Help Interpreting the New Review Scores? (PDF - 292 KB)
- Overview of Enhancements with a Focus on Applicants (PDF - 125 KB)
- Overview of Enhancements with a Focus on

http://enhancing-peer-review.nih.gov/index.html

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Summary

- Lots of help is available from web sites and also to program directors
- NIBIB is the tip of the bioengineeering iceberg at NIH, consider us first but not exclusively
- Funding is available at all career stages and at many levels
- About 85% of NIH funds go out to the community