Director's Report

National Advisory Council for Biomedical Imaging and Bioengineering

January 23, 2020

Bruce J. Tromberg, Ph.D.
Director
National Institute of Biomedical Imaging and Bioengineering
Thank You!

https://videocast.nih.gov/watch=35689

Pam Glikman
Alisha Hopkins
Asha Storm
Julia Ringel
Jacklyn Ebiasah
Ahmad El Hendawy
NIBIB Strategic Plan working groups met Jan 22, 2020
>55 participants in 7 sub-groups

9:40 – 10:40 am Update

<table>
<thead>
<tr>
<th>Data Science and Computation</th>
<th>Engineered Biology</th>
<th>Sensing Health and Disease</th>
<th>Imaging Health and Disease</th>
<th>Advanced Therapies/Cures</th>
<th>Technology Development Pipeline</th>
<th>Biomedical Imaging &amp; Bioengineering Workforce</th>
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<tbody>
<tr>
<td>Christine Cooper</td>
<td>Paula Hammond</td>
<td>Samuel Achilefu</td>
<td>Richard Buxton</td>
<td>Kate Egan</td>
<td>Andrea Belz</td>
<td>Gilda Barbino</td>
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<td>Qi Duan</td>
<td>Joshua Leonard</td>
<td>Nancy Allbritton</td>
<td>Shawn Chen</td>
<td>Ranu Jung</td>
<td>Richard Leapman</td>
<td>Rashid Bashir</td>
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<td>Maryellen Giger</td>
<td>Jessica Meade</td>
<td>Zane Arp</td>
<td>Vincent Ho</td>
<td>Brian Pogue</td>
<td>Jack Linehad</td>
<td>Zeynep Erim</td>
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<td>Jay Humphrey</td>
<td>Robert Nerem</td>
<td>Tatjana Atanasijevic</td>
<td>Elizabeth Jones</td>
<td>Marjolein van der Meulen</td>
<td>Raymond MacDougall</td>
<td>Ilana Goldberg</td>
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<td>Lydia Kavraki</td>
<td>David Rampulla</td>
<td>David Grainger</td>
<td>Randy King</td>
<td>Michael Wolfson</td>
<td>Ed Margerrison</td>
<td>Raphael Lee</td>
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<td>Kyle Myers</td>
<td>Gordana Vunjak-Novakovic</td>
<td>Amy Herr</td>
<td>Richard Leapman</td>
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<td>Todd Merchak</td>
<td>Carolyn Meltzer</td>
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<td>Grace Peng</td>
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<td>Thomas Johnson</td>
<td>Guoying Liu</td>
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<td>Sohi Rastegar</td>
<td>Julia Ringel</td>
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<td>Behrouz Shabestari</td>
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<td>Tiffani Lash</td>
<td>Cynthia McCullough</td>
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<td>Greg Sorensen</td>
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<td>Hari Shroff</td>
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<td>Kathy Nightingale</td>
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<td>Andrew Weitz</td>
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<td>Bruce Rosen</td>
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<td>Daniel Sodickson</td>
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<td>Patricia Wiley</td>
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<td>George Zubal</td>
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NIBIB Organization: Kris Kandarpa, Kate Egan, Jill Heemskerk, David George, Jackie Martinez, Saltant Satabayeva
FY 2020 Appropriation* for NIH, enacted Dec 2019: total of $41.45B reflects a $2.5B or 6.4% increase to FY 2019 allocation of $38.95B.

FY 2020 Operating Budget for NIBIB: total of $404.638M reflects a $16.525M or 4.26% increase to the FY 2019 final allocation $388.133M.

NIBIB R01 2019 Payline: 19th percentile

*Consolidated Appropriations Act, 2020 (HR 1865) funds NIH full year.
Welcome!

Samuel Achilefu, Ph.D.

- Michel M. Ter-Pogossian Professor of Radiology; Professor of Medicine, Biomedical Engineering, Biochemistry & Molecular Biophysics; Chief, Optical Radiology Laboratory; Vice Chair, Innovation and Entrepreneurship, Mallinckrodt Institute of Radiology; Washington University

- Optical imaging of tumors and angiogenesis; design and development of new molecular probes and nanomaterials for imaging genes, proteins, and pathophysiologic processes.

- Tissue-specific multi-modal imaging agents and technology: optical, MRI, PET, SPECT; Wearable surgical guidance and visualization tools.
Welcome!

Jennifer Barton, Ph.D.

- Director, BIO5 Institute; Department head of Biomedical Engineering; Associate Vice President for Research; Professor of Biomedical Engineering, Electrical and Computer Engineering, Optical Sciences, and Agriculture and Biosystems Engineering; University of Arizona

- Develops miniature, multi-modal optical endoscopes w/ optical coherence tomography (OCT) and fluorescence spectroscopy for early cancer detection & diagnosis in patients and pre-clinical models.

- Work on light-tissue interactions and dynamic optical properties of blood foundational for vascular phototherapies
Welcome!

- Lester John & Lynne Dewar Lloyd Distinguished Professor of Bioengineering, University of California, Berkeley

- Chan Zuckerberg Biohub Investigator, Faculty Scientist, Biological Systems & Engineering Division, Lawrence Berkeley National Laboratory; Faculty Director, UC Berkeley Bakar Fellows Program

- Advanced microfluidic technologies for quantifying biomolecules in complex biological fluids down to single cell and sub-cellular resolution.

- Focus on POC clinical diagnostics, proteomics, & biomarker validation.

Amy Herr, Ph.D.
Thank you!

- Virginia and D.K. Ludwig Professor in Cancer Research, Stanford University SOM
- Chair, Department of Radiology
- Director, Molecular Imaging Program at Stanford (MIPS),
- Director, Canary Center for Cancer Early Detection,
- Director, Precision Health and Integrated Diagnostics Center

Sanjiv Gambhir, Ph.D.
Former NIBIB Council Member
Professor Maryellen Giger, University of Chicago: Developed QuantX, AI-based software for breast cancer diagnosis.

- First FDA-cleared software to aid in breast cancer diagnosis for use in radiology
- NIH top AI highlight for OSTP
New Program Leadership Appointments

Zeynep Erim, Ph.D.
Director, Division of Interdisciplinary Training

Behrouz Shabestari, Ph.D.
Director, NIBIB National Technology Centers Program

David Rampulla, Ph.D.
Director, Division of Discovery Science and Technology (DDST)
New Program Leadership Appointments

**ESTEEMED Concept Clearance**

Zeynep Erim, Ph.D.
Director, Division of Interdisciplinary Training

**P41 Concept Clearance**

Behrouz Shabestari, Ph.D.
Director, NIBIB National Technology Centers Program

**David Rampulla, Ph.D.**
Director, Division of Discovery Science and Technology (DDST)
The Future of DDST

Division of Biosystems Engineering...

...mathematical and computational methods, biotransducers, and engineered systems to recapitulate, manipulate, and interface with biology...

More in May 2020
Thank you!

Šeila Selimović, Ph.D.
Program Director (DDST)

DDST Program Change

• Left NIH to lead ENACT (Early Notification to Act, Control, and Treat) program at BARDA

• NIBIB: 2015-2019, biosensors, tissue chips, and tissue engineering.
• NIH Director’s Award
  Coordinated collaboration between NIBIB and DOD agencies in trauma/critical care technologies.
Welcome!

Moria Bittmann, Ph.D.

DDST Program Director

DDST Program Change

- BS, Mechanical Engineering, University of Michigan
- PhD, Bioengineering, Univ of Ill, Chicago; Rehab Inst of Chicago
  - Robotic therapies for post-stroke rehabilitation
- Post-doc: University of Wisconsin, computational biomechanics
- NINDS, Health Program Specialist supporting BRAIN Initiative
  - BRAIN diversity early career funding opportunity
- NIBIB: biomechanics and bioelectrics
NIBIB Intramural Research Program Review

BSC + Ad Hoc: Dec 8-10, 2019

More in May 2020
Harnessing Data Science for Health Discovery and Innovation in Africa

https://commonfund.nih.gov/africadata

DS-I Africa

1. Research Hubs focused on key health problems
2. DS-I Training Programs
3. Ethical, Legal and Social Implications of DS-I Research
4. Open Data Science Platform and Coordinating Center
5. Symposia (years 1 and 6)

- Implementation Plan under review;
- Symposium planned for June 24-26, 2020 in Nairobi, Kenya
- Working groups for each Initiative are assembled and functioning;
- Notices of Intent (NOSIs) are scheduled to be announced in February 2020;
- FOAs planned to be published April 2020;
NIH launches new collaboration to develop gene-based cures for sickle cell disease and HIV on global scale

October 23, 2019, 11:30 AM EDT

$1,000,000 Challenge: NIBIB, OD, NIAID, NIDDK, FIC

NIH TECH ACCELERATOR CHALLENGE FOR GLOBAL HEALTH

BMGF POC team: Dan Wattendorf, Andrew Trister, Arunan Skandarajah, Jessica Lee
**NTAC: Non-invasive Diagnostic Technologies for Global Health**

### CHALLENGE

Non-invasive platform device with the potential to diagnose, track disease state and/or response to therapy for at least two diseases in the vasculature.

One or more must be malaria, sickle cell disease, or anemia, given the high burden of disease in global health settings.

<table>
<thead>
<tr>
<th>Concept, design and feasibility data</th>
<th>Participants present design and initial feasibility for non-invasive diagnostic platform based upon preset judging specifications.</th>
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<tbody>
<tr>
<td>Plan to achieve use case (cost, time to results, portability, ease of use, lifespan)</td>
<td>Winners can receive additional funding and in-kind support from BMGF for technology acceleration, commercialization</td>
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</tbody>
</table>

**NIH TECH ACCELERATOR CHALLENGE FOR GLOBAL HEALTH**
2019 ML-MSM Meeting

October 24 – 25, 2019

- Integrate math & physics w/ computer science
- Apply to Human Safety
- Apply to Digital Twins

Spread the word!
Will be videocast
REGISTER! Search: IMAG wiki

Grace Peng
Upcoming Meeting:

IMAG-AND: March 17-18, 2020
at the NIH Conference Center & Remote Access

- Key venue for the **mechanistic multiscale modeling** (MSM) community
- Keynote address: **Dr. Hannah Valantine**, Chief Officer for Scientific Workforce Diversity at the NIH
- Meeting implementation will be a mindfulness exercise for nurturing diversity

**Sessions:**
- Diverse Contexts for MSM
- Diverse Approaches for MSM
- Diverse Credibility Assessments for MSM
- Diverse Funding for MSM
- Diverse Pedagogy for MSM
- Diverse Impacts of MSM
- Implicit Bias and Stereotype Threat training

**Co-chairs:** Dr. Silvia Blemker and Dr. Shayn Peirce-Cottler
R21 Trailblazer FOA (PAR-20-084)

- Re-issued January 8, 2020

Specifically for New/Early Stage Investigators

- Three years / $400,000 direct costs
- Limited preliminary data is allowed, but must be limited to one-half page which may include one figure
- High-risk/High-reward projects Similar to Exploratory R21 mechanism, but for New Investigators

Encourages:

- Early stage developmental ideas that promise transformation
- Underrepresented groups strongly encouraged
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2015 -- 2019
R21 awards ESI/NI: (16) 18% → (41) 63%
Payline: <12% → 19%
NIA has released a Notice of Special Interest to fund Alzheimer’s-focused supplements for projects that are not focused on Alzheimer’s disease.

NIHIB participated in the pilot program in 2017 and helped start this partnership by funding the first round of supplements.

The partnership has expanded to involve 21 Institutes and Centers in 2020.

Supplements allow PIs to investigate the applications of technologies to Alzheimer’s and Related Dementias.

Applications due March 7, 2020
Design by Biomedical Undergraduate Teams Challenge

2019: $80,000 in Prizes

- 52 applications from 32 universities in 18 states
- Total of 250 students engaged

2020: $100,000 in Prizes

- Application Deadline: June 1
- Winners Announced: August 25
- Awards: October 15, 2020 BMES SD

NEW PRIZE
$15,000 NIMHD prize
Low resource settings

Zeynep Erim, Ph.D.
Funding Opportunities: NOSIs

NOT-EB-19-020
Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC)
Postdoctoral Career Transition Award to Promote Diversity (K99/R00)
Early career, independent investigators from diverse backgrounds conducting research

NOT-EB-19-022
Technological Innovations for Advancing Clinical SPECT Imaging
New SPECT imaging technologies and SPECT analogues of PET brain radiopharmaceuticals.

NOT-EB-19-023
Highlights interest in receiving SBIR and STTR grant applications focused in the following areas:
• Modeling and Simulation Technologies
• Pediatric Technologies
• Point-of-Care Ultrasound Technologies
• Clinical Decision Support Technologies

Zeynep Erim
George Zubal
Todd Merchak
Ilana Goldberg
Dream

Basic Science and Technology Development

Clinical Diagnostics and Therapeutics
Reality

Basic Science and Technology Development

Clinical Diagnostics and Therapeutics

Barriers
Shift Equilibrium *to Right*

**Basic Science and Technology Development**

Increase activity

**Clinical Diagnostics and Therapeutics**

Accelerate Translation, Validation, Commercialization

**Barriers**

Reduce Barriers
Shift Equilibrium to Right

NIH - NSF - FDA - NIST Partnerships?

Basic Science and Technology Development

Clinical Diagnostics and Therapeutics

Increase activity

Reduce Barriers

NSF ERC

NSF IUCRC

Accelerate Translation, Validation, Commercialization

Barriers
BRAIN Update

Bruce Rosen, MD, Ph.D.

Professor, Health Sciences and Technology, Harvard Medical School
Laurence Lamson Robbins Professor of Radiology, Harvard Medical School
Director, Athinoula Martinos Center for Biomedical Imaging, MGH
Director, NIBIB P41 Center Functional Neuroimaging Technologies
NIBIB BRAIN representative