



NIBIB Contact

Christine A. Kelley, Ph.D.
Director
Division of Discovery Science
& Technology
301-451-4778
kelleyc@mail.nih.gov
www.nibib.nih.gov



Introduction

The mission of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) is to improve human health by leading the development and accelerating the application of biomedical technologies. The Institute is committed to integrating the physical and engineering sciences with the life sciences to advance basic research and medical care.

The Division of Discovery Science and Technology is one of three divisions within the NIBIB's Office of Extramural Science Programs. Through grant, cooperative agreement, and contract mechanisms, the division promotes, fosters, and manages bioengineering research programs in the funding areas listed below.

Research Programs

- **Biomaterials** — Novel materials that can be used for a broad spectrum of biomedical applications such as implantable devices, drug and gene delivery, tissue engineering, imaging agents, theranostics, and biosensors. This includes functional or smart materials, as well as biomimetic and biosimilar materials. Areas of interest are modeling, design, simulation, synthesis, and characterization of materials, as well as the interaction of biomaterials with biological systems including biocompatibility, biomechanics, surface science (e.g. tools to assess host-implant interactions), and biofilm management.
(Rosemarie Hunziker, hunzikerr@mail.nih.gov)
- **Delivery Systems and Devices for Drugs and Biologics** — The area of delivery systems and devices for drugs and biologics includes the delivery of nucleic acids, peptides, proteins, vaccines, genes, small molecules, and theranostics. Emphasis is on the engineering of new delivery vehicles that include novel biomaterials, liposomes, micelles, nanoparticles, dendrimers, etc. Delivery strategies may include targeted delivery, controlled release, and energy-assisted delivery modalities such as ultrasound, electroporation, electrophoresis, implantable pumps, and stimulators. The scope of work may include development of the delivery vehicle or device itself, and proof of concept testing through preliminary in vitro and in vivo studies.
(Jessica Tucker, tuckerjm@mail.nih.gov)
- **Mathematical Modeling, Simulation, and Analysis** — Mathematical models and computational algorithms with potential clinical or biomedical applications, with a focus on multi-scale modeling. This area includes development of simulation technology for training and education in clinical practice and biomedical research, simulation algorithms for understanding and predicting health and disease, as well as mathematical, statistical, and signal processing methods for analysis of complex biomedical systems, clinical diagnosis, and patient monitoring.
(Grace Peng, penggr@mail.nih.gov)
- **Medical Devices** — Design, development, validation and evaluation, of medical devices and implants. This includes exploratory research on next generation technology for basic research, diagnostic and therapeutic use; and the development of tools to predict performance, and perform explant analyses.
(Grace Peng, penggr@mail.nih.gov)
- **Rehabilitation Engineering** — Modeling, simulation, analysis, robotics, and systems engineering technologies. Application areas include early stage technology development of neuroprosthesis and neuroengineering, robotics rehabilitation, virtual rehabilitation, and biomechanics of human movement.
(Grace Peng, penggr@mail.nih.gov)
- **Sensors and Microsystems** — Bioanalytical technologies that enable the detection, identification, and quantification of clinically or biologically relevant analytes in complex matrices. Novel sensing modalities as well as BioMEMS, microfluidics, and nanoscale technologies are covered in this area. Areas of emphasis include development of miniaturized devices for point-of-care technologies and devices for high-throughput screening. Low-cost manufacturing approaches as well as modeling for device design are additional topics of interest.
(Tiffani Lash, baileyti@mail.nih.gov)
- **Surgical Tools, Techniques, and Systems** — New medical technologies to improve the outcomes of surgical interventions. Examples include relevant technologies for minimally invasive surgeries, medical simulators, and robotically assisted surgical systems.
(Grace Peng, penggr@mail.nih.gov)
- **Synthetic Biology for Technology Development** — Synthetic biology, the design and wholesale construction of new biological parts and systems and the re-design of existing, natural biological systems for tailored purposes, has applications in biomaterials, drug and gene delivery systems and devices, mathematical modeling, simulation and analysis, medical implants, sensors, and tissue engineering. This program may include, for example, the use of synthetic biology approaches for the development of signal-sensing biomaterials; genetic switches for the control of gene delivery; synthetically engineered viruses and bacteriophages as therapies; synthetic circuits for gene therapy; synthetic control of biosensors through environmentally responsive promoters; and synthetic control systems for the production of biomaterials.
(Jessica Tucker, tuckerjm@mail.nih.gov)
- **Telemedicine** — The design, development, and evaluation of systems that enable medical diagnosis and treatment at a distance, including image transmission systems, remote monitoring systems, and mobile or wearable health devices that help maintain or recover health.
(Tiffani Lash, baileyti@mail.nih.gov)

- **Tissue Engineering and Regenerative Medicine**
— Enabling technologies to develop functional cell, tissue, and organ substitutes to repair, replace, or enhance biological function either in vivo or in vitro. This multidisciplinary field draws upon and integrates advances in biomaterials, cell and developmental biology, physiology, in vitro “tissue-on-a-chip” systems development, imaging, computational modeling, bioreactor design, biomechanics, and novel engineering methods.
(Rosemarie Hunziker, hunzikerr@mail.nih.gov)

Funding Opportunities

See: <http://www.nibib.nih.gov/funding>

Collaboration

An important aspect of the Institute’s mission is encouraging collaborations among the institutes and centers at NIH, other federal agencies, and the private sector.

- **American Institute for Medical and Biological Engineering (AIMBE)** — Collaboration to develop validation and qualification guidelines for new in vitro tools and models for the pre-clinical drug discovery process.
<http://www.nibib.nih.gov/news-events/meetings-events/fifth-aimbenih-workshop-validation-and-qualification-new-vitro-tools-and>
- **Armed Forces Institute for Regenerative Medicine (AFIRM)** — The U.S. Army Medical Research and Materiel Command (USAMRMC), Office of Naval Research (ONR), and the NIH have established AFIRM, which is dedicated to the repair and regeneration of battlefield injuries through the use of tissue engineering and regenerative medicine. Therapies developed by the AFIRM will also serve trauma and burn patients in the public at large. This trans-agency effort includes academic and industry scientists, biotechnology companies, hospitals, the U.S. Army Institute of Surgical Research, and the NIBIB as the NIH lead.
<http://www.afirm.mil/>
- **Biomedical Information Science and Technology Initiative (BISTI) Consortium** — BISTI is aimed at maximizing NIH’s opportunities to benefit from the use of computer science and technology to address problems in biology and medicine.
<http://bisti.nih.gov>
- **Interagency Modeling and Analysis Group (IMAG)**— IMAG brings together program officers across federal agencies to communicate, disseminate, and plan collaborative activities and joint initiatives related to computational and analytical modeling and analysis of biomedical, biological, and behavioral systems
<http://www.imagwiki.nibib.nih.gov>. IMAG hosts the NIH Population Modeling SIG and the Multi-scale Modeling (MSM) Consortium. <http://www.imagwiki.org/mediawiki>
- **Multi-Agency Tissue Engineering Sciences (MATES) Working Group** — The MATES Working Group facilitates communication about tissue engineering and regenerative medicine activities across NIH institutes and other federal agencies by conducting monthly meetings and maintaining a common website. The working group also cosponsors funding opportunities, scientific meetings, and workshops; facilitates the development of standards; and monitors new technology development in the field.
<http://tissueengineering.gov/>

- **National Nanotechnology Initiative (NNI)** — The NNI is a multi-governmental agency program aimed at accelerating the discovery, development, and deployment of nanometer-scale science, engineering, and technology. The Nanoscale Science, Engineering, and Technology Subcommittee (NSET) is an interagency body operating under the National Science and Technology Council (NSTC) that coordinates the planning, budgeting, program implementation, and review of NNI activities. The NIBIB has institutional representation on the NSET Subcommittee as one of the leading ICs at the NIH supporting the research and development of nanotechnology for healthcare applications. In 2007, the NIBIB, in collaboration with the NIEHS, established the NanoHealth Enterprise Initiative in response to the health and safety directives of the NNI program. This initiative is a public-private partnership focused on examining the physicochemical interactions of engineered nanomaterials with biological systems.
<http://www.nano.gov/>

- **NIBIB Point-of-Care Technologies Research Network (POCTRN)** — This network of centers was created to drive the development of appropriate point-of-care diagnostic technologies through collaborative efforts that simultaneously merge scientific and technological capabilities with clinical need.
<http://www.nibib.nih.gov/Research/POCTRN>

- **Neuroprosthesis Group (NPG)** — NPG brings together program officers across NIH and other agencies to communicate, disseminate, and plan collaborative activities related to neuroprosthesis and neuroengineering.

NIBIB Contacts

You may contact Rishi Mathura, NIBIB Scientific Program Specialist at rishi.mathura@nih.gov, or the Program Directors listed previously about funding opportunities or the application process. We welcome the opportunity to speak with potential applicants about the institute’s programs. Areas of scientific coverage for each member of the program staff are shown in the Research Programs section of this fact sheet and are available on the NIBIB website at <http://www.nibib.nih.gov/Research/ProgramAreas>.