



### NIBIB Contact

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### 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 bioinspired, 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, surface science, and biofilm management. (Rosemarie Hunziker, [hunzikerr@mail.nih.gov](mailto:hunzikerr@mail.nih.gov))
- **Drug and Gene Delivery Systems and Devices** – New or improved technologies for the controlled and targeted delivery of therapeutic agents. Areas of emphasis include new delivery vehicles and accompanying advances in imaging methods and modalities to track delivery, assess efficacy, and predict in vitro and in vivo behavior. Feedback-controlled loops that include sensing and delivery and the use of energy-assisted devices, such as ultrasound, to improve therapeutic delivery are also areas of interest. (Steven Zullo, [zullost@mail.nih.gov](mailto:zullost@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](mailto:penggr@mail.nih.gov))
- **Medical Devices and Implant Sciences** – Design, development, evaluation, and validation of medical devices and implants. This includes exploratory research on next generation concepts for diagnostic and therapeutic devices and development of tools to assess host-implant interactions, optimize surfaces to prevent biofilm formation, predict performance, and perform explant analyses. (Rosemarie Hunziker, [hunzikerr@mail.nih.gov](mailto:hunzikerr@mail.nih.gov))
- **Micro-Biomechanics** – The study of micromechanics of cells and intracellular structures. Examples include biomechanics of cell adhesion and cell morphology and migration on biomaterials. (Richard Conroy, [Richard.Conroy@nih.gov](mailto:Richard.Conroy@nih.gov))
- **Nanotechnology** – Enabling technologies that exploit unique and emerging properties of materials, devices, probes, and systems at the nanoscale. This includes the nanoscale engineering and design of multifunctional systems or components for disease detection, diagnosis, and treatment. Examples include fabrication of nanoparticles or nanoassemblies for drug and gene delivery, tools to characterize material properties and interfacial phenomena, new approaches to sense and quantify biologically important molecules and surfaces, and the development of nanotechnologies to engineer functional tissues and advanced imaging agents or probes. (Steven Zullo, [zullost@mail.nih.gov](mailto:zullost@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](mailto: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.

(Brenda Korte, [kortebr@mail.nih.gov](mailto:kortebr@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 and robotically assisted surgical systems. (Grace Peng, [penggr@mail.nih.gov](mailto:penggr@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. (Brenda Korte, [kortebr@mail.nih.gov](mailto:kortebr@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 “organoid” systems development, imaging, computational modeling, bioreactor design, biomechanics, and novel engineering methods. (Rosemarie Hunziker, [hunzikerr@mail.nih.gov](mailto:hunzikerr@mail.nih.gov))

## Funding Opportunities

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

## 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://nibib.gov/newsevents/meetingevents/pastevents>
- **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.nibib.nih.gov/Research/IMAG>. 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 co-sponsors 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 Stephanie Sabourin, NIBIB Biomedical Engineer at [sabourinsm@mail.nih.gov](mailto:sabourinsm@mail.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>.