

Fact Sheet

National Institute of Biomedical Imaging and Bioengineering

DIVISION OF DISCOVERY SCIENCE & TECHNOLOGY



NIBIB CONTACT

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Introduction

The mission of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) is to improve health by leading the development and accelerating the application of biomedical technologies. The NIBIB provides funding for biomedical imaging and bioengineering research and encourages the integration of the engineering, physical, computational, and life sciences to advance human health by improving quality of life and reducing the burden of disease.

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 and biomedical imaging 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, and biosensors. Areas of emphasis include the design, synthesis, characterization, processing, and manufacturing of materials and devices (Lori Henderson, hendersonlori@mail.nih.gov) as well as the interaction of biomaterials with biological systems including biocompatibility, surface science, biomimetics, and biofilm management. (Albert Lee, alee@mail.nih.gov)
- **Biomedical Informatics** – Improved methods for the collection, storage, classification, retrieval, integration, analysis, and dissemination of quantitative and qualitative biomedical data. The tools and resources from this program are intended to support other NIBIB program areas in biomedical imaging and bioengineering. (Zohara Cohen, zcohen@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, and the use of energy-assisted devices such as ultrasound to improve therapeutic response. (Lori Henderson, hendersonlori@mail.nih.gov)
- **Image Processing, Visual Perception and Display** – Algorithms for post-acquisition image processing and analysis, including image segmentation, registration, atlas generation, and morphology measurement. Tools and models for the evaluation of medical image perception, analysis and interpretation. Human-computer interface technologies for improved image interpretation. (Zohara Cohen, zcohen@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. Development of simulation technology for training and education in clinical practice and biomedical research, and simulation algorithms for understanding and predicting health and disease. Development of mathematical, statistical and signal processing methods for the analysis of complex biomedical systems, clinical diagnosis, and patient monitoring. (Grace Peng, 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, predict performance, and perform explant analyses. (Lori Henderson, hendersonlori@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. (Lori Henderson, hendersonlori@mail.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 the 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. See program announcement PAR-08-052 or 053. (Lori Henderson, hendersonlori@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.

- **Sensors and Microsystems (Continued)** - An area of emphasis is development of miniaturized devices for point-of-care technologies. Low-cost manufacturing approaches as well as modeling for device design are additional topics of interest (Brenda Korte, kortebr@mail.nih.gov). Bioprocess Technologies – Areas of interest include bioprocess unit operations, and process analytical technologies. (Albert Lee, alee@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)
- **Telehealth** – Technology development that incorporates telemetry and remote access in the acquisition, analysis and monitoring of biomedical data. (Grace Peng, penggr@mail.nih.gov)
- **Tissue Engineering** – 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, high throughput assay development, imaging, computational modeling, bioreactor design, and novel engineering methods. (Rosemarie Hunziker, hunzikerr@mail.nih.gov)

Collaborations

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. The division is currently involved in several collaborative activities:

- **Armed Forces Institute for Regenerative Medicine (AFIRM)** – The U.S. Army Medical Research and Materiel Command (USAMRMC), with the Office of Naval Research (ONR) and the NIH, have established AFIRM, 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 two large teams of academic and industry scientists, biotechnology companies, hospitals, the US Army Institute of Surgical Research, and the NIBIB as the NIH lead.
- **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/MultiScaleModeling/IMAG>
- **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 works-hops; 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 the 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>
- **NIH Roadmap Regenerative Medicine Coordinating Committee** – The NIBIB is the lead institute on a new NIH Regenerative Medicine (RM) Coordinating Committee to establish better communication and collaboration in RM across the NIH and the RM research community.
- **Neuroimaging Informatics Tools and Resources Clearinghouse (NITRC)** – The NIH Blueprint for Neuroscience Research, a framework to enhance cooperative activities among the NIH Office of the Director and 15 NIH Institutes and Centers, has established NITRC to facilitate the dissemination and adoption of neuroimaging informatics tools and resources. In connection with the NITRC, small grants are awarded to support the enhancement and documentation of existing neuroimaging informatics tools and resources in order to make them suitable for adoption by the extended neuroimaging research community. NIBIB program staff lead this effort on behalf of the NIH Blueprint community. <http://www.nitrc.org/>
- **Neuroprosthesis Group (NPG)** – NPG brings together program officers across NIH and other agencies to communicate, disseminate, and plan collaborative activities related to neuro-prosthesis and neuroengineering.
- **Roundtable on Biomedical Engineering Materials and Applications (BEMA)** – The National Academy of Sciences BEMA Roundtable provides a neutral setting for the exchange of information regarding biomaterials science, research, and practice. BEMA identifies and discusses priority issues in the general areas of biomaterials and their use in the development, manufacture, and application of medical devices. <http://www.bema.org/>

NIBIB Contacts

You may contact NIBIB program staff with your questions 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 can be found above under [Research Programs](#) and on the NIBIB website at:

<http://www.nibib.nih.gov/Research/ProgramAreas>.