

Fact Sheet

National Institute of Biomedical Imaging and Bioengineering

DIVISION OF APPLIED 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 a home for the research communities of biomedical imaging and bioengineering, and encourages the integration of the physical sciences and the life sciences to advance human health by improving quality of life and reducing the burden of disease.

The Division of Applied 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

- **Image-Guided Interventions** – This program involves the use of images for guidance, navigation, and orientation in minimally invasive procedures to reach specified targets. Examples include image-guided interventions for minimally invasive therapies such as surgery and radiation treatment, biopsies, and the delivery of drugs, genes, and therapeutic devices. (John Haller, hallerj@mail.nih.gov)
- **Magnetic, Biomagnetic and Bioelectric Devices** – This program involves the technological development of magnetic, biomagnetic and bioelectric devices, e.g., EEG and MEG. Examples include novel detectors, increased sensitivity and spatial resolution, improved reconstruction algorithms, and multiplexing with other imaging techniques. (Alan McLaughlin, mclaugal@mail.nih.gov)
- **Magnetic Resonance Imaging and Spectroscopy** – This program involves the technological development of MR imaging and MR spectroscopic imaging for research and clinical applications. Examples include fast imaging, high-field imaging, design of novel RF and gradient coils, novel pulse sequences, design of novel contrast mechanisms, imaging informatics, in vivo EPR imaging, and molecular imaging. The emphasis is on technological development rather than detailed applications to specific diseases or organs. (Alan McLaughlin, mclaugal@mail.nih.gov)
- **Molecular Imaging** – This program involves the development, evaluation, and application of multimodal molecular imaging/therapy agents and novel molecular imaging methods for studying normal biological and pathophysiological processes at the cell and molecular levels, as well as the clinical or preclinical applications of molecular imaging research. Examples of supported research include the development and application of surface functionalized nanoparticles, bioactivated imaging agents, theranostic agents, and high sensitivity/specificity molecular imaging approaches. (Yantian Zhang, Yantian.Zhang@nih.gov)
- **Nuclear Medicine** – This program involves functional and molecular imaging using gamma-ray or positron emissions from radioactive agents that are injected, inhaled, or ingested into the body and then concentrate in specific biological compartments. Two particularly active areas are the positron emission tomography (PET) or single photon emission computed tomography (SPECT) combined with either CT or MRI, and the design of higher resolution, lower cost PET and SPECT devices for studies using molecular probes in small animals. Other topics of interest include the development of better radiopharmaceuticals, crystal scintillators and collimators, and novel approaches to dual-isotope imaging and to dosimetry. (John Haller, hallerj@mail.nih.gov)



- **Optical Imaging and Spectroscopy** – This program involves the development and application of optical imaging, microscopy, and spectroscopy techniques; and the development and application of optical imaging contrast agents. Examples of supported research areas include fluorescence imaging, bioluminescence imaging, OCT, IR imaging, diffuse optical tomography, optical microscopy and spectroscopy, confocal microscopy, multiphoton microscopy, flow cytometry, and the development of innovative light sources and fiber optic imaging devices. (Yantian Zhang, Yantian.Zhang@nih.gov)
- **Ultrasound: Diagnostic and Interventional** - The diagnostic ultrasound program includes the design, development, and construction of innovative transducers, transducer arrays, and materials including development of optoacoustic, thermoacoustic, and micromachined transducer technology. Also included are development of innovative image acquisition and display methods, innovative signal processing methods, and functional imaging methods including elastography, Doppler and color Doppler, and radiation force imaging. It also includes the development of innovative imaging agents for contrast enhancement and molecular imaging. The interventional ultrasound program includes the use of ultrasound as an active agent for therapeutic intervention and as an adjunct for enhancement of non-ultrasound therapy applications. Examples include high-intensity focused ultrasound (HIFU) as a non-invasive or minimally invasive interventional surgical tool for uses such as ultrasound as a thrombolytic agent and drug delivery across tissue barriers. Other applications include the use of ultrasound contrast agents for targeted drug delivery, enhancement of HIFU and thrombolytic therapies, and image-guided therapies. (Hector Lopez, lopezh@mail.nih.gov)
- **X-ray, Electron, and Ion Beam** - This program involves computed tomography (CT), computed radiography (CR), digital radiography (DR), digital fluoroscopy (DF), and related modalities. Research areas of support include the development of flat panel detector arrays and other detector systems, flat-panel CT, CT reconstruction algorithms for the cone-beam geometry of multislice CT, approaches to radiation dose reduction, especially with CT, and novel x-ray applications such as those utilizing scattered radiation and tissue-induced x-ray phase shifts (Hector Lopez, lopezh@mail.nih.gov)
- **NIH Roadmap National Centers for Biomedical Computing (NCBC)** - The National Centers for Biomedical Computing (NCBC) are part of the NIH Roadmap for Bioinformatics and Computational Biology. There are seven centers that cover image processing, biophysical modeling, biomedical ontologies, information integration, systems biology, and tools for phenotype and disease analysis. The centers create innovative software programs and other tools that enable the biomedical community to integrate, analyze, model, simulate, and share data on human health and disease. NIBIB supports programs that promote collaborations with the NCBCs.
- **Biomedical Information Science and Technology Initiative (BISTI)** - 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.
- **Liver Disease Subcommittee of the Digestive Diseases Interagency Coordinating Committee** - This interagency subcommittee helps to coordinate efforts related to liver and biliary diseases. The subcommittee includes representatives from 17 NIH institutes and centers.
- **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 leads this effort on behalf of the NIH Blueprint community. <http://www.nitrc.org/>

Collaborations

The division is currently involved in several important collaborative activities:

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 [Current Research](#) and on the NIBIB website at:

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