DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Institute of Biomedical Imaging and Bioengineering

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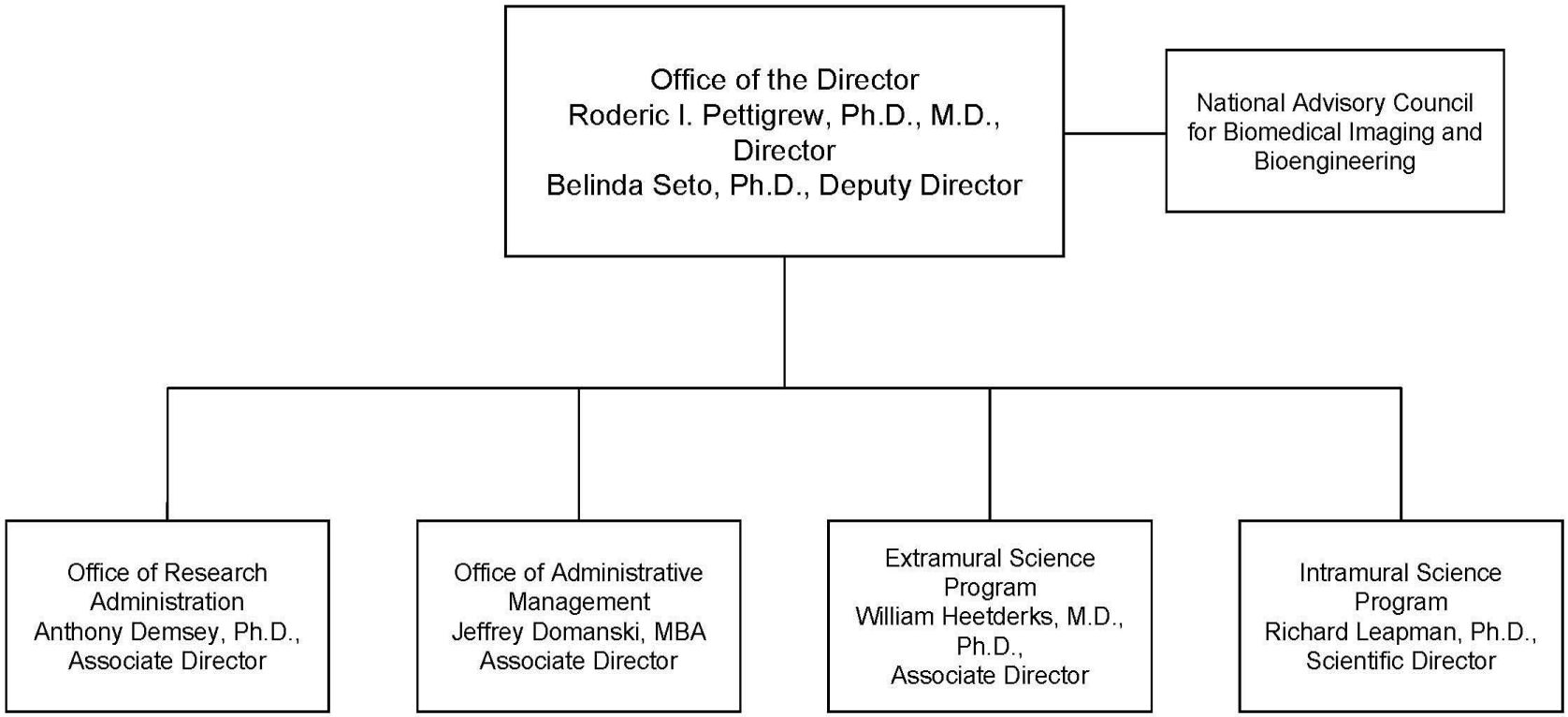
NIBIB ORGANIZATIONAL CHART



NATIONAL INSTITUTES OF HEALTH

National Institute of Biomedical Imaging and Bioengineering

For carrying out section 301 and title IV of the Public Health Service Act with respect to biomedical imaging and bioengineering research $322,106,000.

NATIONAL INSTITUTES OF HEALTH
National Institute of Biomedical Imaging and Bioengineering

Amounts Available for Obligation [1/]
(Dollars in Thousands)

Source of Funding	FY 2010 Actual	FY 2011 CR	FY 2012 PB
Appropriation	316,582	316,582	322,106
Type 1 Diabetes	0	0	0
Rescission	0	0	0
Supplemental	0	0	0
Subtotal, adjusted appropriation	316,582	316,582	322,106
Real transfer under Director's one-percent transfer authority (GEI)	(507)	0	0
Real transfer under Secretary's one-percent transfer authority	(47)	0	0
Comparative Transfers to NLM for NCBI and Public Access	(137)	(269)	0
Comparative transfer under Director's one-percent transfer authority (GEI)	507	0	0
Subtotal, adjusted budget authority	316,398	316,313	322,106
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	316,398	316,313	322,106
Unobligated balance lapsing	0	0	0
Total obligations	316,398	316,313	322,106

1/ Excludes the following amounts for reimbursable activities carried out by this account:
FY 2010 - $4,160 FY 2011 - $4,160 FY 2012 - $4,160

NATIONAL INSTITUTES OF HEALTH

National Institute of Biomedical Imaging and Bioengineering

Budget Mechanism - Total [1/]

(Dollars in Thousands)

MECHANISM	FY 2010 Actual		FY 2011 CR		FY 2012 PB		Change vs. FY 2010	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants								
Research Projects								
Noncompeting	378	$153,748	374	$162,039	365	$163,409	(13)	$9,661
Administrative Supplements	*14*	799	*14*	799	*14*	799	*0*	0
Competing:								
Renewal	38	17,961	24	9,926	24	10,098	(14)	(7,863)
New	137	52,077	119	48,465	120	49,303	(17)	(2,774)
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	175	$70,038	143	$58,391	144	$59,401	(31)	($10,637)
Subtotal, RPGs	553	$224,585	517	$221,229	509	$223,609	(44)	($976)
SBIR/STTR	36	$7,965	35	$7,695	36	$7,845	0	($120)
Research Project Grants	589	$232,550	552	$228,924	545	$231,454	(44)	($1,096)
Research Centers								
Specialized/Comprehensive	5	$6,896	5	$6,896	5	$6,965	0	$69
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	17	19,378	17	19,378	17	19,572	0	194
Comparative Medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	22	$26,274	22	$26,274	22	$26,537	0	$263
Other Research								
Research Careers	33	$3,982	33	$3,982	33	$4,022	0	$40
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	0	0	0	0	0	0	0	0
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	0	0	0	0	0	0	0
Other	10	768	10	768	10	776	0	8
Other Research	43	$4,750	43	$4,750	43	$4,798	0	$48
Total Research Grants	654	$263,574	617	$259,948	610	$262,789	(44)	($785)
Research Training	FTTPs		FTTPs		FTTPs			
Individual Awards	19	$884	19	$884	19	$919	0	$35
Institutional Awards	240	10,184	235	10,184	235	10,591	(5)	407
Total Research Training	259	$11,068	254	$11,068	254	$11,510	(5)	$442
Research & Development Contracts	9	$13,037	16	$15,494	16	$17,706	7	$4,669
(SBIR/STTR)	*2*	*$16*	*2*	*$16*	*2*	*$16*	*0*	*$0*
	FTEs		FTEs		FTEs		FTEs	
Intramural Research	33	$11,358	33	$11,699	33	$11,816	0	$458
Research Management and Support	64	17,361	65	18,104	65	18,285	1	924
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIBIB	97	$316,398	98	$316,313	98	$322,106	1	$5,708

1/ All items in italics are "non-adds": items in parenthesis are subtractions

Major Changes in the Fiscal Year 2012 Budget Request

Major changes by budget mechanism are briefly described below. The FY 2012 budget request for NIBIB is $5.708 million more than the FY 2010 level, for a total of $322.106 million.

Research Project Grants (RPGs; -$1.096 million; total $231.454 million): NIBIB will continue to fund a substantial number of RPGs, 545 awards in FY 2012 (a decrease of 44 from FY 2010).

Training (+$0.442 million; total $11.510 million): NIH will provide an across-the-board increase in FY 2012 of four percent for stipends levels under the Ruth L. Kirschstein National Research Service Award training program to continue efforts to attain the stipend levels recommended by the National Academy of Sciences. This will build on the two percent increase in stipend levels for FY 2011. Stipend levels were nearly flat for several years and the requested increase will help to sustain the development of a highly qualified biomedical research workforce. Training costs are also reflected in the FY 2012 Technological Competitiveness - Bridging the Sciences program total, as all NIBIB training activities are within that program.

Research & Development Contracts (+$4.669 million; total $17.706 million): NIBIB's R&D contracts total includes NIBIB's share of several trans-NIH initiatives, such as the Therapies for Rare and Neglected Diseases program, the Basic Behavioral and Social Sciences Opportunity Network (OppNet), and support for a new synchrotron at the Brookhaven National Laboratory.

NATIONAL INSTITUTES OF HEALTH
National Institute of Biomedical Imaging and Bioengineering
Summary of Changes
(Dollars in Thousands)

FY 2010 Actual				**$316,398**
FY 2012 Estimate				**322,106**
Net change				**$5,708**
	2012 Estimate		**Change from FY 2010**	
CHANGES	**FTEs**	**Budget Authority**	**FTEs**	**Budget Authority**
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2010 pay increase		$3,195		$19
b. January FY 2012 pay increase		3,195		0
c. One less day of pay (n/a for 2011)		3,195		(12)
d. Payment for centrally furnished services		1,583		16
e. Increased cost of laboratory supplies, materials, and other expenses		7,038		4
Subtotal		$18,206		$27
2. Research Management and Support:				
a. Annualization of January 2010 pay increase		$8,887		$53
b. January FY 2012 pay increase		8,887		0
c. One less day of pay (n/a for 2011)		8,887		(34)
d. Payment for centrally furnished services		1,408		15
e. Increased cost of laboratory supplies, materials, and other expenses		7,990		15
Subtotal		$36,059		$49
Subtotal, Built-in		$54,265		$76

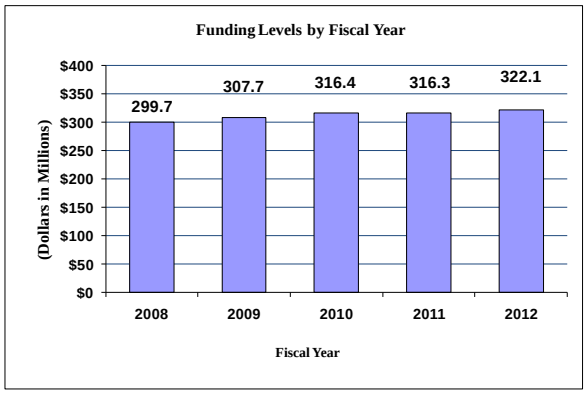
NATIONAL INSTITUTES OF HEALTH
National Institute of Biomedical Imaging and Bioengineering

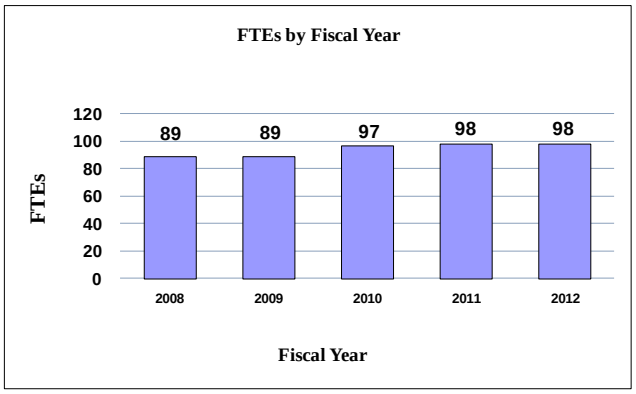
Summary of Changes--continued

CHANGES	2012 Estimate		Change from FY 2010	
	No.	**Amount**	**No.**	**Amount**
B. Program:				
1. Research Project Grants:				
a. Noncompeting	365	$164,208	(13)	$9,661
b. Competing	144	59,401	(31)	(10,637)
c. SBIR/STTR	36	7,845	0	(120)
Total	545	$231,454	(44)	($1,096)
2. Research Centers	22	$26,537	0	$263
3. Other Research	43	4,798	0	48
4. Research Training	254	11,510	(5)	442
5. Research and development contracts	16	17,706	7	4,669
Subtotal, Extramural		$292,005		$4,326
	FTEs		FTEs	
6. Intramural Research	33	$11,816	0	$431
7. Research Management and Support	65	18,285	1	875
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program	98	$322,106	1	$5,632
Total changes			1	$5,708

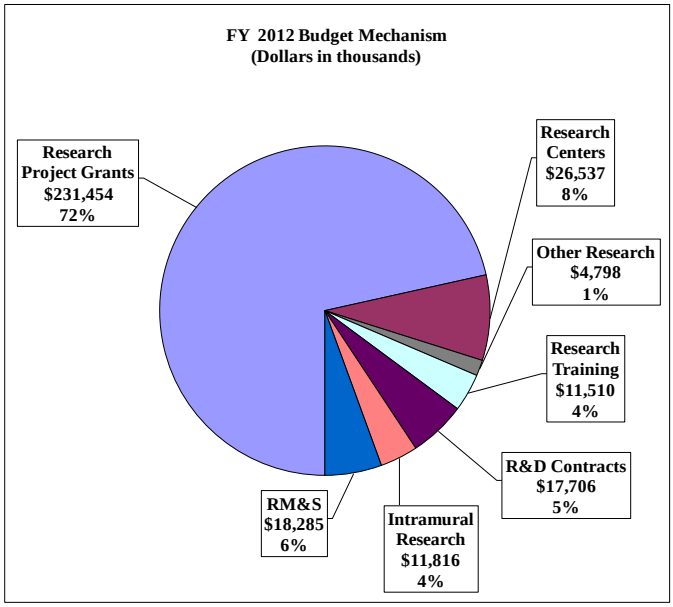
Budget Graphs

History of Budget Authority and FTEs:

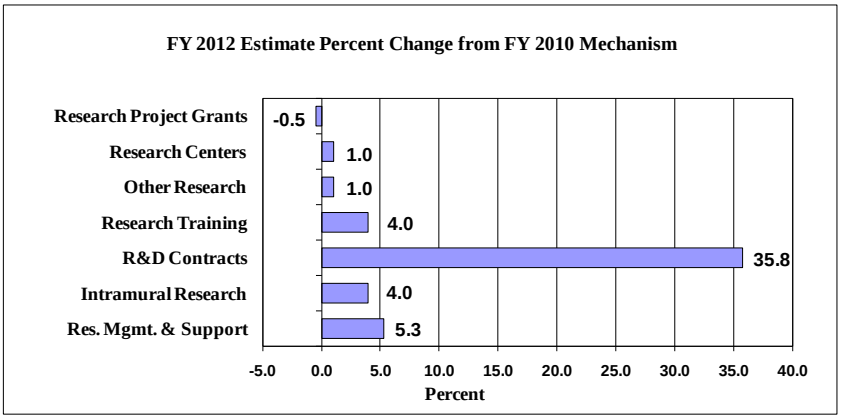




Distribution by Mechanism:



Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH

National Institute of Biomedical Imaging and Bioengineering

Budget Authority by Activity [1/ 2/]

(Dollars in thousands)

	FY 2010 Actual		FY 2011 CR		FY 2012 PB		Change vs. FY 2010	
Extramural Research	**FTEs**	**Amount**	**FTEs**	**Amount**	**FTEs**	**Amount**	**FTEs**	**Amount**
Detail:								
Applied Science and Technology		$168,486		$167,736		$170,682		2,196
Discovery Science and Technology		94,160		93,740		95,387		1,227
Technological Competitiveness - Bridging the Sciences		25,033		25,034		25,936		903
Subtotal, Extramural		$287,679		$286,510		$292,005		$4,326
Intramural Research	33	$11,358	33	$11,699	33	$11,816	0	$458
Research Management & Support	64	$17,361	65	$18,104	65	$18,285	1	$924
TOTAL	97	$316,398	98	$316,313	98	$322,106	1	$5,708

1/ Includes FTEs which are reimbursed from the NIH Common Fund for Medical Research.

2/ Includes Real Transfers and Comparable Adjustments as detailed in the "Amounts Available for Obligation" table.

NATIONAL INSTITUTES OF HEALTH
National Institute of Biomedical Imaging and Bioengineering

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2010 Amount Authorized	FY 2010 Estimate	2012 Amount Authorized	FY 2012 PB
Research and Investigation	Section 301	42§241	Indefinite	$316,398,000	Indefinite	$322,106,000
National Institute of Biomedical Imaging and Bioengineering	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$316,398,000		$322,106,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Biomedical Imaging and Bioengineering

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2003	$120,502,000	$270,494,000	$283,100,000	$280,100,000
Rescission				($1,821,000)
2004	$282,109,000	$282,109,000	$289,300,000	$288,900,000
Rescission				($1,771,000)
2005	$297,647,000	$297,647,000	$300,800,000	$300,647,000
Rescission				($2,438,000)
2006	$299,808,000	$299,808,000	$309,091,000	$299,808,000
Rescission				($2,998,000)
2007	$296,810,000	$294,850,000	$297,606,000	$296,887,000
Rescission				$0
2008	$300,463,000	$303,318,000	$304,319,000	$303,955,000
Rescission				($5,310,000)
Supplemental				$1,588,000
2009	$300,254,000	$310,513,000	$307,254,000	$308,208,000
Rescission				$0
2010	$312,687,000	$319,217,000	$313,496,000	$316,582,000
Rescission				$0
2011	$325,925,000		$325,415,000	
Rescission				
2012	$322,106,000			

Justification of Budget Request

National Institute of Biomedical Imaging and Bioengineering

Authorizing Legislation: Section 301 and title IV of the Public Health Service Act, as amended.

Budget Authority:

	FY 2010 Actual	FY 2011 Continuing Resolution	FY 2012 Budget Request	FY 2012 + / - FY 2011
BA	$316,398,000	$316,313,000	$322,106,000	$5,708,000
FTE	97	98	98	1

Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

Director's Overview

The mission of National Institute of Biomedical Imaging and Bioengineering (NIBIB) is to improve human health by leading the development and accelerating the application of biomedical technologies. By focusing on improving health care through technology, NIBIB invests resources in scientific and technological opportunities and in the next generation of researchers. NIBIB is at the forefront of translating scientific advances into engineered medical solutions. The use of appropriate point-of-care (POC) diagnostic tests can mean the difference between the right treatment or continued sickness or death. In low-resource settings both in the U.S. and in developing countries, diagnostic capabilities are minimal, inadequate, or non-existent. New and innovative POC diagnostic technologies designed especially for these challenging situations will have a major impact on global public health and health disparities by providing timely and appropriate patient treatment.

NIBIB partners with the Department of Biotechnology of the Ministry of Science and Technology in India to support the development of low-cost diagnostic and therapeutic medical technologies that will be used in underserved communities worldwide. Tuberculosis (TB) has one of the greatest health disparities between Whites and racial/ethnic minorities and underserved populations in the U.S. Current diagnostic methods require microbial cultures which take weeks to get results and are available primarily in affluent health care communities. It can be difficult for minorities to follow-up with their physician, often leading to inadequate treatment. NIBIB supports a small business to develop a low-cost, simple, and rapid POC test for TB that will enable rapid diagnosis and ensure that appropriate treatment is given to all affected individuals, thereby reducing the public health impact of this contagious disease.

One of the most devastating neurodegenerative diseases is Alzheimer's Disease (AD). Early detection of the risk of developing AD is difficult because there are no measurable "biomarkers". NIBIB supports the development of novel quantitative anatomical imaging approaches that can

be used in place of clinical outcomes as biomarkers for AD. These approaches, which use the clinical resources of the Alzheimer's Disease Neuroimaging (ADNI) project, are being used for "high throughput" screening of genes that might provide early indicators of risk for AD. The combined approaches of genomics with spatial location by neuroimaging provide a powerful tool to pinpoint genomic and structural abnormalities in AD.

Early detection of cancer is critical to provide effective therapy. NIBIB-supported investigators recently reported the detection of a single metastatic cell from lung cancer in one billion normal blood cells.[1, 2] These circulating tumor cells (CTCs) may also be released into the bloodstream of patients with invasive but localized cancers. The presence of CTCs may be an early indicator of tumor invasion into the bloodstream long before distant metastases are detected. Identifying CTCs may be viewed as performing liquid biopsies which is especially advantageous for prostate cancer. Researchers plan to extend their work to develop a POC microchip to non-invasively isolate CTCs from patients with other types of cancer, thus improving the management and treatment of this devastating disease.

Cancer cells can have different metabolite levels than "normal" cells. Magnetic Resonance Imaging (MRI) approaches can determine metabolite levels in intact tissues and organs, but have been plagued by poor sensitivity. NIBIB supports the development of a novel MRI technique that increases the sensitivity of MRI by over a thousand-fold, and can detect cancerous tissue by characterizing the levels of selected tissue metabolites. For example, preliminary animal results demonstrate that cancerous regions of the prostate have substantially different lactate and pyruvate levels than "normal" regions of the prostate, and that the metabolite patterns appear to reflect the severity of the disease.[3, 4] NIBIB is supporting the translation of these approaches to human studies (the first of which have just started), and is collaborating with NCI to apply these technologies to the detection, characterization and treatment of human cancers.

Health information technology research enables the integration of clinical, diagnostic, and treatment data with the patient's medical history in a comprehensive electronic health record that will improve clinical decision-making. The ability to connect and exchange diagnostic information and medical images between health care providers, clinics, and hospitals will help provide timely information needed for effective health care and will help reduce unnecessary and

[1] Sequist LV, Nagrath S, Toner M, Haber DA, Lynch TJ. The CTC-chip: an exciting new tool to detect circulating tumor cells in lung cancer patients. J Thorac Oncol. 2009 Mar; 4(3):281-3.

[2] Nagrath S, Sequist LV, Maheswaran S, Bell DW, Irimia D, Ulkus L, Smith MR, Kwak EL, Digumarthy S, Muzikansky A, Ryan P, Balis UJ, Tompkins RG, Haber DA, Toner M. Isolation of rare circulating tumour cells in cancer patients by microchip technology. Nature. 2007 Dec 20; 450(7173):1235-9.

[3] Lupo JM, Chen AP, Zierhut ML, Bok RA, Cunningham CH, Kurhanewicz J, Vigneron DB, Nelson SJ. Analysis of hyperpolarized dynamic 13C lactate imaging in a transgenic mouse model of prostate cancer. Magn Reson Imaging. 2010 Feb; 28(2):153-62. Epub 2009 Aug 19.

[4] Albers MJ, Bok R, Chen AP, Cunningham CH, Zierhut ML, Zhang VY, Kohler SJ, Tropp J, Hurd RE, Yen YF, Nelson SJ, Vigneron DB, Kurhanewicz J. Hyperpolarized 13C lactate, pyruvate, and alanine: noninvasive biomarkers for prostate cancer detection and grading. Cancer Res. 2008 Oct 15; 68(20):8607-15.

duplicative procedures. A patient-centered approach to comprehensive electronic health records will allow individuals to access their own information, enabling them to play a role in their wellness by equipping them with the knowledge to ask appropriate questions about treatment options. Additionally, patients are also empowered to provide this information to any and all health care providers as needed, independent of their location or where the medical data were created or stored. NIBIB is spearheading research in new technologies to address issues such as: interoperability of data systems, compatibility of computer software across medical institutions, security of data during transmission, HIPPA compliance, and availability of affordable data systems for patient care providers.

A central theme of the research approaches described above is their interdisciplinary nature. The Institute's emphasis on interdisciplinary approaches to biomedical research and training has provided unprecedented opportunities for collaborations among the life and physical scientists. As experience and training of investigators associated with this modern paradigm continue to develop and progress, there will be advances in biology and medicine through the quantitative, physical sciences, and engineering perspective, as well as the development of technologies that reflect the translation of biological mechanisms, and applied technologies. These advances will produce remarkable improvements in the health of individuals around the world.

Overall Budget Policy: The FY 2012 request for NIBIB is $322.1 million, an increase of $5.7 million or +1.8 percent over the FY 2010 enacted level. NIBIB funding policies give special consideration to grant applications that bridge and integrate the life and physical sciences, and also focus on enhancing support for new investigators.

Funds are included in R&D contracts to reflect NIBIB's share of NIH-wide funding required to support several trans-NIH initiatives, such as the Therapies for Rare and Neglected Diseases program, the Basic Behavioral and Social Sciences Opportunity Network (OppNet), and support for a new synchrotron at the Brookhaven National Laboratory. For example, each IC that will benefit from the new synchrotron will provide funding to total NIH's commitment to support this new technology--$10 million.

Applied Science and Technology (AST): The AST program supports research, development and application of technologies for improving patient care. In addition to developing new technologies, AST also supports research that improves current clinical techniques. One example is the optimization of breast cancer diagnostics by the development of dedicated breast CT scanners. Another example is the optimization of cardiac exams using fast MRI approaches. New optical imaging techniques are enabling minimally-invasive biopsies for prostate cancer and uterine cancer. Low-cost optical endoscopes have been developed to detect and ablate ovarian cancer. Focused ultrasound is being developed to enable delivery of potentially toxic cancer drugs exclusively at the target tissue. New electron paramagnetic resonance (EPR) imaging techniques are being developed that will allow better optimization of radiation dose for treatment of cancer. Upon development and validation, these technologies are integrated into specific clinical applications in collaboration with disease-specific NIH Institutes. In addition, research to deploy such technology around the world is a focus of global health research. The promise of these efforts is earlier diagnosis, better management of chronic diseases, and more effective treatment of acute disorders.

Budget Policy: The FY 2012 budget estimate for the AST program is $171.9 million, a $3.4 million increase (2.0%) over the FY 2010 level. High priority is given to new and early-career investigators and to research that bridges the physical and life sciences. AST will place a high priority on molecular imaging and will continue to support research for image-guided interventions. High priority will also continue to be given to investigator-initiated research, including exploratory research grants and Bioengineering Research Partnerships.

Program Portrait: Development of Novel Imaging Approaches for Prostate Cancer

FY 2010 Level: $3.0 million
FY 2012 Level: $4.0 million

Prostate cancer is the second most common cancer in American men and is responsible for approximately 30,000 deaths per year. Prostate specific antigen (PSA) and digital rectal exams (DRE) provide useful "screening" approaches for prostate cancer but are not specific enough to discriminate between indolent forms and aggressive forms of the disease.

This poor specificity means that prostate tissue biopsies are needed to determine risk and plan treatment. The tissue biopsies have two problems. First, most prostate biopsies are "blind" and not specifically targeted to tumor areas that are likely to be aggressive. Multiple biopsy samples (typically about a dozen) are needed to get an adequate representation of the condition of the prostate. Second, because the biopsies are invasive, they cannot be used for routine monitoring of response to treatment. NIBIB is working to overcome these limitations by developing novel non-invasive imaging approaches that can detect aggressive tumors and accurately guide biopsies to these areas. Several promising approaches are being developed including MR spectroscopy, diffusion MRI, perfusion MRI, combined MRI/ultrasound, electrical impedance imaging, and multi-photon optical imaging.

The development of novel imaging techniques for prostate cancer could: (1) provide more powerful screening approaches, (2) provide better image guidance of prostate biopsies, (3) avoid the use of invasive biopsies altogether in treatment decisions, and (4) improve and personalize prostate cancer treatment. The development of these approaches should lead to new paradigms for clinical care of prostate cancer.

Discovery Science and Technology (DST): The DST program supports the engineering of solutions to biomedical problems through the support of research on the development of bioengineering and biomedical imaging technologies and related research in the life and physical sciences. The DST program portfolio is broad in scope and includes innovative and revolutionary research focused on biomaterials; biomedical informatics including health information technologies; biomechanics; computational modeling, simulation, and analysis; drug and gene delivery devices; image processing; visual perception and display; medical devices and implant science; molecular imaging agents; nanotechnology; rehabilitation engineering; sensors and microsystems; surgical systems; telehealth and mobile medical technologies; and regenerative medicine including stem cell research. Of particular note, the DST program currently supports a Network for Point-of-Care Technology Development Centers that merge scientific and technological capabilities with clinical need in the areas of neuro-emergencies, sexually transmitted diseases, disaster readiness, and global health.

In addition, the program has been supporting an initiative on Predictive Multiscale Models of the Physiome in Health and Disease for several years. The goal of this long-term effort is to develop mathematical and computational models that accurately describe complex medical responses at

the cellular as well as clinical levels and that can be used to predict response to therapy. The Program also supports research on the development of multifunctional drug and gene delivery systems to target and release therapies at the target site in order to improve efficacy and reduce toxicity. The DST program also supports the development of consensus standards which play a critical role in the effectiveness of new biomedical technologies and their translation into clinical practice. Recently, the program released an initiative on technologies for independent living. Technologies that monitor health or deliver care in a real-time, accessible, effective, and minimally-obtrusive way will be developed. These technologies will integrate, process, analyze, communicate, and present data so that the individuals are engaged and empowered in their own healthcare. This personal empowerment has the potential to significantly improve the quality of life for people with disabilities, people aging with mild impairments, and individuals with chronic conditions.

Budget Policy: The FY 2012 budget estimate for the DST program is $96.1 million, a $1.9 million increase (2.0%) over the FY 2010 level. DST will give high priority to supporting new and early-career investigators. Priority will be given to investigator-initiated research grants as this is the foundation on which future advances in new biomedical technologies and improved patient care will be developed. Large grants and Center programs will continue to receive support as will investment in other scientific opportunities and high priority areas. The research program in biomedical informatics will receive strong support.

Program Portrait: Technologies for Independent Living

FY 2010 Level: $2.0 million
FY 2012 Level: $5.0 million

Longer life expectancies, the increased prevalence of chronic conditions, and a societal interest in allowing people to age "in place" suggest a demand for new home-based and mobile technologies to enable functional independence and improve quality of life of people with disabilities, chronic conditions, or mild impairments associated with aging. NIBIB supports collaborations between biomedical engineers and clinical care-providers to develop independent-living technologies that monitor health, inform clinical decisions, and deliver therapies in real-time and with minimal intrusion. These technologies are made possible by bioengineering advances in sensor technologies as well as computer methods for data integration, data analysis, and data presentation.

Technologies to manage mild cognitive impairment and dementia are crucial to a successful health care system. NIBIB supports a project in which researchers are developing "smart" environments that can recognize when an individual unexpectedly changes his or her routine in a significant way and can alert the individual or his/her caretaker appropriately. These environments, or complex systems of sensors and alerts, are called "smart" in that they have the capacity to learn. They are trained by "watching" the normal routine of the individual so that they can identify a deviation from the routine. Once such technologies are fully developed and shown to provide valuable alerts, they are likely to become indispensible tools in monitoring an individual's everyday functional status, thereby extending the amount of time individuals can live independently in their own homes.

This program is part of NIBIB's larger vision for telehealth: to move the delivery of health care from the hospital, clinic, and doctor's office to the home, shopping mall, workplace, or wherever the individual might be.

Technological Competitiveness – Bridging the Sciences: Basic research provides a foundation of new scientific discoveries on which to build improvements in health care. Building new treatments and diagnostics on this foundation requires engineering, clinical research, and basic sciences working together to construct practical solutions. Interdisciplinary approaches underpin

technological advancement that will position the U.S. well in a highly competitive global environment. NIBIB has several interdisciplinary research programs that exemplify our investment toward technological competitiveness and the translation of science to treatments. The Quantum Grant program seeks to apply innovative biomedical technologies to critical national health care needs with the goal of reducing the burden of a major disease or public health problem. The Bioengineering Research Partnerships Program is another example of interdisciplinary translational research that supports a team that includes an engineer and a life scientist to solve a problem that neither could address alone. An NIBIB-led interagency program on bridging the sciences is identifying demonstration projects to explore new approaches to bridging the biological, computational, and physical science. In this endeavor we are working cooperatively with the National Science Foundation as well as with other NIH Institutes and Centers, and private organizations. The medical informatics program focuses on health information technologies that enable better clinical decision-making, sharing of clinical image data, dissemination of information about the latest scientific research results and effectiveness studies. In FY 2010, NIBIB and National Institute of Child Health and Human Development (NICHD) initiated a program for "Team-Based Design in Biomedical Engineering Education." This program will support the enhancement of team-based design courses in undergraduate Biomedical Engineering and will serve to enhance the technological competitiveness of American industry by preparing a cadre of engineers who are trained to solve problems using a team-based, interdisciplinary approach. These efforts are closely aligned with the NIH Director's key themes of "translating basic science to new and better treatments" and "reinvigorating the biomedical research community."

Budget Policy: The FY 2012 budget estimate for the Technological Competitiveness – Bridging the Sciences program is $24.0 million, a $1.0 million decrease (-4.1%) from the FY 2010 level. High priorities include increasing training stipends by 6% higher than the FY 2010 levels. Other high priorities include developing interdisciplinary training programs and supporting the Quantum Grants Program, which establishes of interdisciplinary research teams to address major healthcare problems.

Program Portrait: Bioengineering Research Partnerships

FY 2010 Level: $31.9 million
FY 2012 Level: $32.5 million

The bioengineering research partnership program uses a multi-disciplinary approach to translate traditional biological and clinical sciences into diagnostics and therapies. The creativity of interdisciplinary teams is resulting in novel products and innovative technologies for addressing biomedical problems.

One project is developing a new surgical approach to the treatment of intractable epilepsy. Advances in medical imaging techniques, in morphing of image data to account for movement during surgery, in integration of neurochemical data with electrophysiological and imaging data are all contributing to improved patient outcomes. Another project is looking at better ways to administer and deliver vaccines. The goal of this project is not to develop the vaccine but, rather, to develop a new way of delivering the vaccine dose to the individual. This potentially could allow for the flu vaccine, for example, to be mailed to homes and then be self-administered much like placing a Band-Aid on your shoulder. Still another project is translating "two-photon microscopy" a technique that has transformed research microscopy over the past 20 years, and applying it at the tip of a catheter, potentially permitting microscopic examination of tissue such as polyps during a colonoscopy without the need for a biopsy. As a final example, another group is developing a "head-only" MRI machine. This device is projected to cost about one fifth of a conventional scanner and to weigh about one tenth of a conventional scanner, thus eliminating the need for both special building modifications and liquid helium for cooling. These and other projects promise to both improve the quality of care and reduce the overall cost.

Intramural Research: The Intramural Program supports NIBIB's mission to integrate bioengineering with the life and physical sciences and to develop new technologies ranging in scale from molecular and cellular to the level of whole organ imaging. A new molecular imaging and nanomedicine research laboratory will develop multimodality molecular imaging probes for the visualization and characterization of diseases and biological processes in an intact whole-body system. This research will also include the development of high sensitivity nanosensors for biomarker detection and individualized diagnosis and treatment (theranostics), nanomedicine for imaging, gene and drug delivery, and monitoring of treatment. A new clinical laboratory will develop patient-based methods for detecting and quantitatively characterizing subclinical cardiovascular disease of the myocardium and blood vessels in both early phase clinical trials as well as in multi-center studies. Areas of study will include genetically-determined disease as well as acquired cardiovascular disease resulting from common risk factors. These studies will use methods based on advanced magnetic resonance techniques, cardiovascular CT scanning, and molecular probes. To aid in understanding diseases at a molecular level, newly formed research groups will engineer genetically-encoded fluorescent proteins as markers and sensors at the nanoscale, and develop super-resolution and high-throughput / high-speed optical imaging techniques for the study of biological processes related to disease and development.

Budget Policy: The FY 2012 budget estimate for the Intramural Research Program is $11.8 million, a $0.5 million increase (4.0%) over the FY 2010 level. This includes funding for a molecular imaging and nanomedicine laboratory aimed at early diagnosis of disease, monitoring therapeutic response, and guiding drug discovery.

Research Management and Support (RMS): NIBIB RMS activities provide administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants, training awards and research and development contracts. RMS functions also encompass strategic planning, coordination, and evaluation of the Institute's programs, regulatory compliance, international coordination, and liaison with other Federal agencies, Congress, and the public.

Budget Policy: The FY 2012 budget estimate for Research Management and Support is $18.3 million, a $0.9 million increase (5.3%) over the FY 2010 level. High priorities of RMS are the scientific support of NIBIB research programs and strategic planning.

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Budget Authority by Object [1/]
(Dollars in Thousands)

	FY 2010 Actual	FY 2012 PB	Increase or Decrease
Total compensable workyears:			
Full-time employment	97	98	1
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary	$0	$0	$0
Average GM/GS grade	12.9	13.0	0.1
Average GM/GS salary	$180,978	$182,000	$1,022
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	$0	$0	$0
Average salary of ungraded positions	0	0	0

	OBJECT CLASSES	FY 2010 Actual	FY 2012 Estimate	Increase or Decrease
	Personnel Compensation:			
11.1	Full-time permanent	$6,199	$6,302	$103
11.3	Other than full-time permanent	2,444	2,467	23
11.5	Other personnel compensation	261	264	3
11.7	Military personnel	0	0	0
11.8	Special personnel services payments	721	722	1
	Total, Personnel Compensation	**$9,625**	**$9,755**	**$130**
12.0	Personnel benefits	$2,295	$2,327	$32
12.2	Military personnel benefits	0	0	0
13.0	Benefits for former personnel	0	0	0
	Subtotal, Pay Costs	**$11,920**	**$12,082**	**$162**
21.0	Travel and transportation of persons	$418	$468	$50
22.0	Transportation of things	89	97	8
23.1	Rental payments to GSA	179	196	17
23.2	Rental payments to others	0	0	0
23.3	Communications, utilities and miscellaneous charges	125	141	16
24.0	Printing and reproduction	10	11	1
25.1	Consulting services	228	254	26
25.2	Other services	2,709	3,018	309
25.3	Purchase of goods and services from government accounts	21,636	26,380	4,744
25.4	Operation and maintenance of facilities	85	92	7
25.5	Research and development contracts	673	1,109	436
25.6	Medical care	9	10	1
25.7	Operation and maintenance of equipment	548	591	43
25.8	Subsistence and support of persons	0	0	0
25.0	**Subtotal, Other Contractual Services**	**$25,888**	**$31,454**	**$5,566**
26.0	Supplies and materials	$1,194	$1,248	$54
31.0	Equipment	1,933	2,110	177
32.0	Land and structures	0	0	0
33.0	Investments and loans	0	0	0
41.0	Grants, subsidies and contributions	274,642	274,299	(343)
42.0	Insurance claims and indemnities	0	0	0
43.0	Interest and dividends	0	0	0
44.0	Refunds	0	0	0
	Subtotal, Non-Pay Costs	**$304,478**	**$310,024**	**$5,546**
	Total Budget Authority by Object	**$316,398**	**$322,106**	**$5,708**

1/ Includes FTEs which are reimbursed from the NIH Common Fund for Medical Research

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Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2010 Actual	FY 2012 PB	Increase or Decrease
Personnel Compensation:			
Full-time permanent (11.1)	$6,199	$6,302	$103
Other than full-time permanent (11.3)	2,444	2,467	23
Other personnel compensation (11.5)	261	264	3
Military personnel (11.7)	0	0	0
Special personnel services payments (11.8)	721	722	1
Total Personnel Compensation (11.9)	**$9,625**	**$9,755**	**$130**
Civilian personnel benefits (12.1)	$2,295	$2,327	$32
Military personnel benefits (12.2)	0	0	0
Benefits to former personnel (13.0)	0	0	0
Subtotal, Pay Costs	**$11,920**	**$12,082**	**$162**
Travel (21.0)	$418	$468	$50
Transportation of things (22.0)	89	97	8
Rental payments to others (23.2)	0	0	0
Communications, utilities and miscellaneous charges (23.3)	125	141	16
Printing and reproduction (24.0)	10	11	1
Other Contractual Services:			
Advisory and assistance services (25.1)	228	254	26
Other services (25.2)	2,709	3,018	309
Purchases from government accounts (25.3)	10,974	12,095	1,121
Operation and maintenance of facilities (25.4)	85	92	7
Operation and maintenance of equipment (25.7)	548	591	43
Subsistence and support of persons (25.8)	0	0	0
Subtotal Other Contractual Services	**$14,544**	**$16,050**	**$1,506**
Supplies and materials (26.0)	$1,194	$1,248	$54
Subtotal, Non-Pay Costs	$16,380	$18,015	$1,635
Total, Administrative Costs	**$28,300**	**$30,097**	**$1,797**

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Details of Full-Time Equivalent Employment (FTEs) [1/]

OFFICE/DIVISION	FY 2010 Actual			FY 2011 CR			FY 2012 PB		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Office of the Director	7		7	7		7	7		7
Extramural Science Program	20		20	21		21	21		21
Office of Research Administration	18		18	18		18	18		18
Office of Administration Management	19		19	19		19	19		19
Intramural Science Program	33		33	33		33	33		33
Total	97	0	97	98	0	98	98	0	98
1/ Includes FTEs which are reimbursed from the NIH Common Fund for Medical Research									
FTEs supported by funds from Cooperative Research and Development Agreements	0	0	0	0	0	0	0	0	0

FISCAL YEAR	Average GS Grade
2008	12.4
2009	12.5
2010	12.9
2011	13.0
2012	13.0

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Detail of Positions [1/]

GRADE	FY 2010 Actual	FY 2011 CR	FY 2012 PB
Total, ES Positions	0	0	0
Total, ES Salary	0	0	0
GM/GS-15	12	13	13
GM/GS-14	23	23	23
GM/GS-13	13	13	13
GS-12	9	9	10
GS-11	5	6	5
GS-10	2	1	1
GS-9	4	4	4
GS-8	1	1	1
GS-7	0	0	0
GS-6	0	0	0
GS-5	0	0	0
GS-4	0	0	0
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	69	70	70
Grades established by Act of July 1, 1944 (42 U.S.C. 207):			
Assistant Surgeon General	0	0	0
Director Grade	0	0	0
Senior Grade	0	0	0
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	0	0	0
Ungraded	25	25	25
Total permanent positions	69	73	73
Total positions, end of year	99	98	98
Total full-time equivalent (FTE) employment, end of year	97	98	98
Average ES salary	0	0	0
Average GM/GS grade	12.9	13.0	13.0
Average GM/GS salary	180,978	182,000	182,000

1/ Includes FTEs which are reimbursed from the NIH Common Fund for Medical Research

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New Positions Requested

	FY 2012		
	Grade	**Number**	**Annual Salary**
Health Science Administrator	15	1	$123,758
Total Requested		1	$123,758