

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Library of Medicine

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**NATIONAL INSTITUTES OF HEALTH**

**NATIONAL LIBRARY OF MEDICINE**

**ORGANIZATION STRUCTURE**

**OFFICE OF THE DIRECTOR**

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Jane Bortnick-Griffith  
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Donald W. King, M.D.  
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**Division of Extramural  
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**Lister Hill National  
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Information**

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Director

## NATIONAL INSTITUTES OF HEALTH

### National Library of Medicine

For carrying out section 301 and title IV of the Public Health Service Act with respect to health information communications, [\$317,947,000] \$318,091,000, of which \$4,000,000 shall be available until expended for improvement of information systems: *Provided*, That in fiscal year [2005] 2006 the Library may enter into personal services contracts for the provision of services in facilities owned, operated or constructed under the jurisdiction of the National Institutes of Health. *Provided further*, That in addition to amounts provided herein, \$8,200,000 shall be available from amounts available under section 241 of the Public Health Service Act to carry out National Information Center on Health Services Research and Health Care Technology and related health services.

[Departments of Labor, Health and Human Services, Education, and Related Agencies Appropriations Act, for Fiscal Year 2005]

**National Institutes of Health  
National Library of Medicine**

**Amounts Available for Obligation 1/**

Source of Funding	FY 2004 Actual	FY 2005 Appropriation	FY 2006 Estimate
Appropriation	\$311,635,000	\$317,947,000	\$318,091,000
Enacted Rescissions	(2,520,000)	(2,801,000)	0
Subtotal, Adjusted Appropriation	309,115,000	315,146,000	318,091,000
Real transfer under NIH Director's one-percent transfer authority to other ICs	682,000	0	0
Comparative transfer to NIBIB for Radiology Program	0	0	0
Comparative transfer to Buildings and Facilities	(569,000)	0	0
Comparative transfer to/from other NIH ICs for NIH Roadmap	(682,000)	0	0
Comparative transfer to Office of the Director for Public Health Reports	(70,000)	0	0
Subtotal, adjusted budget authority	308,476,000	315,146,000	318,091,000
Unobligated Balance, start of year	563,000	0	0
Unobligated Balance, end of year	0	0	0
Subtotal, adjusted budget authority	309,039,000	315,146,000	318,091,000
Unobligated balance lapsing	(195,000)	0	0
Total obligations	308,844,000	315,146,000	318,091,000

1/ Excludes the following amounts for reimbursable activities carried out by this account:

FY 2004 - \$15,856,000; FY 2005 - \$15,693,000; FY 2006 - \$15,693,000

Excludes \$1,147.50 in FY 2004 and \$3,575.57 in FY 2005 for royalties.

**Justification  
National Library of Medicine**

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

Budget Authority:

FY 2004		FY 2005		FY 2006		Increase or	
<u>Actual</u>		<u>Appropriation</u>		<u>Estimate</u>		<u>Decrease</u>	
<u>FTEs</u>	<u>BA</u>	<u>FTEs</u>	<u>BA</u>	<u>FTEs</u>	<u>BA</u>	<u>FTEs</u>	<u>BA</u>
666	\$308,476,000	661	\$315,146,000	663	\$318,091,000	2	\$2,945,000

This document provides justification for the Fiscal Year 2006 activities of the National Library of Medicine, including HIV/AIDS activities. A more detailed description of NIH-wide Fiscal Year 2006 HIV/AIDS activities can be found in the NIH section entitled “Office of AIDS Research (OAR).”

**INTRODUCTION**

The National Library of Medicine (NLM), founded in 1836, is the world’s largest library of the health sciences. The Library moved from the mall in Washington, D.C. to the campus of the National Institutes of Health in Bethesda, Maryland, in 1962. The Library has two buildings that house the books, journals, and other materials and the various communications research operations carried out by the staff. The Library, as a public institution, welcomes patrons of all kinds—students, scientists, health practitioners, and the general public—and has many services and resources for them to use in their search for health-related information.

The Library is particularly well suited to serve these patrons. Its collections encompass all the health sciences, in many languages. From 900-year-old manuscripts to today’s medical advances, whether on vellum, paper, film, or in databases, the National Library of Medicine is an unrivalled resource. The Library is acknowledged as the leader in creating medical information databases that are available, free, on the World Wide Web. In fact, the number of searches done each year on the various NLM electronic data resources approaches a *billion*.

The National Library of Medicine is assuming new roles that befit it as a leader of 21<sup>st</sup> century medicine: the Library today is a leading source of human genome information and, at the same time, it has become a trustworthy source of health information for the public. On the one hand, the NLM, through the Web operations of its National Center for Biotechnology Information (NCBI), receives hundreds of thousands of visitors a day seeking molecular biology information, ranging from DNA sequences and protein structures to related biomedical research literature. On the other hand, the extensive consumer health information issued by NIH institutes and centers forms the backbone of NLM’s MedlinePlus information service, whose 6 million visitors each month retrieve 60 million pages from the site. The following sections describe the Library’s

information services and the concomitant research and development activities that gave rise to them and give us a glimpse of what the future holds.

## **STORIES OF DISCOVERY**

The National Library of Medicine has long been an innovator in disseminating medical information—from the *Index Medicus*, begun in the 19<sup>th</sup> century, to the first successful application of computers to a large-scale bibliographic system in the 20<sup>th</sup> century, to an unmatched array of Web-based medical information services in the 21<sup>st</sup> century. In fact, the *Index Medicus*, begun in 1879, ceased publication in December 2004, a “victim” of the success of NLM’s Web-based Medline/PubMed, a database of 15 million references and abstracts to scientific journal articles. The “stories of discovery” that follow range from databases and research tools for scientists and health professionals to a variety of Web information services intended for the general public.

### ***Information Services for Health Professionals and the Scientific Community***

#### ***Medline/PubMed***

The original role of the Library, that is, providing access to the published literature of the health sciences, continues to be the mainstay of NLM services. The 5,000 member institutions of the National Network of Libraries of Medicine, a network created and funded by the National Library of Medicine, are NLM’s partners in making health science information available. Most biomedical scientists and health professionals have, directly or indirectly, availed themselves of the Library’s information products at some time in their career. One heavily used service is Medline/PubMed, which makes available millions of references and abstracts from thousands of journals published around the world, and in many languages, since the 1950s. It expands at the rate of more than half a million records a year.

The pioneering Medline project, begun in the early seventies, evolved from the computerized system used to produce the *Index Medicus*, which the NLM had installed in 1964. Medline was the first successful marriage of a large reference database with a national telecommunications network. The eighties saw the introduction of “Grateful Med,” a software program created by the NLM that one could load onto a PC and, equipped with a modem and a password, search Medline right from one’s home, office, or laboratory. Grateful Med was eagerly snapped up not only by librarians but also by health professionals, scientists, students, lawyers, medical journalists and others, who saw the average charge of \$2 per Medline search as a bargain.

This, of course, is the age of the Internet and the World Wide Web. The National Institutes of Health Web site is the second most heavily trafficked site in the Federal Government, and the NLM databases account for the major share of that use. In 1997, free Medline searching via the Web began using a new system called PubMed. For the first time, anyone with access to the Web could search through what is now a database of 15 million references and abstracts for medical journal articles. The response was immediate and startling: from 7 million Medline searches (1996) the usage climbed dramatically and now stands at more than 670 million searches

annually, with page views totaling 2.5 billion. Since 1996 NLM has added citations for articles going back to 1950 as part of its effort to digitize older print materials.

Improvements to PubMed continue to be introduced, and today it offers a high degree of flexibility to users. For example, there are now Web links to more than 90 percent of the journals represented in Medline, allowing users to have access to the full text of articles referenced in the database. A user's view of PubMed can be customized to highlight electronic and print journals available through the local hospital or academic health sciences library with which he or she is affiliated. Where links to electronic full text are not available, the user may use PubMed to place an online order for an article directly from a library in the National Network of Libraries of Medicine.

### *PubMed Central*

An increasingly popular service for the professional community and the public is PubMed Central. This is a rapidly growing digital archive of life sciences journal literature to which publishers electronically submit peer-reviewed research articles. NLM undertakes to guarantee free access to the material; copyright remains with the publisher or the author. There are now more than 350,000 current and retrospective journal articles from more than 160 journals available free of charge in the PubMed Central electronic archive. In 2004, The Wellcome Trust of the U.K., in partnership with the Joint Information Systems Committee and the National Library of Medicine, announced plans to digitize the complete backfiles of a number of important and historically significant medical journals for PubMed Central. In addition to creating a digital copy of every page in the backfiles, the digitization process will also create a PDF file for every discrete item (article, editorial, letter, advertisement, etc.) in the archive, and use optical character recognition technology to generate searchable text. Creating such "digital archives" as PubMed Central to ensure that the world's biomedical literature is properly recorded and available for future generations is an important NLM responsibility.

### *GenBank*

The NLM component that created Medline/PubMed and PubMed Central is the National Center for Biotechnology Information (NCBI). Within the scientific community, the NCBI is also well known for GenBank, a database of all publicly available DNA sequences. GenBank now contains more than 37 million sequence entries from 165,000 species. The database, which is accessed by some 50,000 scientists daily, contains more than 100 complete genomes as well as protein product and other relevant genetic information. Receiving, analyzing, curating, and disseminating molecular sequence data (which doubles every 18 months) is at the core of NCBI's function. Scientists also use such tools as "BLAST" (Basic Local Alignment Search Tool) a suite of programs that lets scientists search enormous quantities of data for sequence similarities that will identify genes and genetic features. "Entrez" allows users to search DNA sequences and literature information with techniques that are fast and easy to use. Other notable contributions by NCBI are in "Scientific Advances" below.

### *Wireless Information System for Emergency Responders (WISER)*

A new information system intended for emergency situation responders was introduced in 2004 by the NLM's Division of Specialized Information Services. The Wireless Information System for Emergency Responders (WISER) employs a hand-held PDA to provide on-the-spot information for first responders about hazardous materials released into the environment. WISER offers mobile support, providing emergency situation responders with critical information where they need it and when they need it. A key feature of WISER is support for identifying an unknown substance. Using a victim's symptoms or a substance's physical properties gathered by observation or sensors, WISER can help the user identify and validate the unknown substance. The tool also allows users to specify the role they are currently playing at the scene of an incident. A first responder, HAZMAT (Hazardous Materials) specialist, or Emergency Medical Services specialist get critical information presented in a sequence that is most relevant to their respective roles. The system is currently designed to work in stand-alone mode; future versions will also operate in connected mode.

### *Information Services for the Public*

The Library first seriously considered creating information services for the general public in 1997 when it became apparent that the Medline/PubMed database for the scientific medical literature was in fact being used heavily by consumers. The following year the NLM Board of Regents formally recommended that the Library expand its mandate to include serving the public. Since that time, NLM has created a series of highly successful information services aimed at consumers.

#### *MedlinePlus*

The first was MedlinePlus, a Web-based service, available in both English and Spanish that provides integrated access to authoritative consumer health information. Where does such "authoritative" information come from? Since the National Institutes of Health publishes a wealth of consumer health information based on the medical research it sponsors, it was natural to start there. Also "recruited" were other Health and Human Services (HHS) agencies, professional societies, and voluntary health agencies, many of which issue authoritative information that the public can trust. With help from members of the National Network of Libraries of Medicine across the country, NLM information specialists select and organized this information and extensively cross-link it.

MedlinePlus, launched in November 1998, today is one of the most heavily trafficked Web sites containing health information for the public. It has more than 670 "health topics," containing, for example, overview information, pertinent clinical trials, alternative medicine, prevention, management, therapies, the latest research, and the latest news from the print media. There are even links to the scientific literature through Medline/PubMed. In addition to the health topics, there are medical dictionaries, encyclopedias, directories of hospitals and providers, and interactive "tutorials" with images and sound. MedlinePlus en español was introduced in 2002 and has grown to virtual parity with the English version. Both scored the highest marks of any Federal Web site in a recent outside evaluation by the American Customer Satisfaction Index



(ACSI). In fact, NLM's success with the ACSI has led to the Library to spearhead an NIH-wide effort to broaden the testing to many NIH Web sites. Another new aspect of MedlinePlus is "Go Local," that is, to link users from MedlinePlus topics to pertinent health and social services in their community. North Carolina and Missouri are the first MedlinePlus partners to go local. More states will be coming online in 2005.

In the six years since its introduction, MedlinePlus has grown tremendously, both in terms of its coverage of health and its usage by the public. As of October 2004 it was being consulted some 60 million times a month by 6 million unique visitors. Even with such heavy usage, the Library actively seeks to promote the database. For example, since the fall of 2002, NLM has collaborated with the American College of Physicians (ACP) Foundation in "Information Rx," a project to encourage physicians to make information referrals to MedlinePlus. Since patients trust their physicians to recommend good health information, the idea is to promote MedlinePlus as the "Web site your doctor prescribes." The Foundation sees this as an opportunity to help member physicians provide reliable health information for their patients. NLM has worked with the ACP governors in several states to pilot the project—specifically in Georgia, Iowa, and Virginia. NLM provided a variety of information materials to the participating physicians, including posters and prescription pads. The Information Rx project was rolled out nationally in New Orleans at the ACP annual meeting in the spring of 2004. The project continues to be expanded and the results so far are encouraging—two thirds of the physicians ranked MedlinePlus as their first or second choice for referring patients.

### *ClinicalTrials.gov*

One popular feature of MedlinePlus is the ability to link from any of the health topics to the NLM database, ClinicalTrials.gov. In the past, information about clinical research was not readily available to the public. Patients typically learned about studies only from their doctors. However, with rising public interest in health care issues, the consumer health movement, and "democratization" of health information through the World-Wide Web, more information about clinical research studies became available from disparate public and private sources. ClinicalTrials.gov, introduced in February 2000, is a Web site that seeks to pull together this information and provide patients, families, and members of the public easy access to information about clinical studies. Each record includes the locations of a study, its design and purpose, criteria for participation, contact information, and further information about the disease and intervention under study. General information on clinical research written in lay language, including a glossary, answers to frequently asked questions, and links to resources, provide ways to place medical research into the context of medical care, essential for the patient or healthy volunteer considering entering a trial. In November 2004, ClinicalTrials.gov contained 12,000 studies sponsored by the public and private sectors in 100 countries. ClinicalTrials.gov integrates previously fragmented information on human studies for different conditions into a single, coherent system, providing the public with an easy-to-use and convenient "one-stop" site for comprehensive information on clinical research studies. New features were introduced in FY 2004 to help users find studies in different ways, such as geographical area (Browse by Map) and patient recruitment status (Browse by Status).

While the need for a clinical trials registry to track all trials and their results has long been recognized, in FY 2004, several groups, including members of Congress, the American Medical Association, and the International Committee for Medical Journal Editors (which includes the *New England Journal of Medicine*, the *Journal of the American Medical Association*, *Annals of Internal Medicine*, and other prominent members), called for greater public access to detailed information about medical studies and their findings. Clinical study sponsors would be required to register detailed descriptions of their protocols, allowing patients, physicians, and researchers, among others to track progress of the research. At the conclusion of the study, research results would be made available to the public. Such public tracking and disclosure of clinical studies would not only make more scientific evidence available, but would promote research efficiency, for example, by allowing researchers to build on previous results and decreasing duplication of effort. Because ClinicalTrials.gov provides an established system for collecting, organizing, and displaying study information, expansion of its role is being considered.

#### *Other Web Services for the Public*

The Library's Division of Specialized Information Services has introduced a number of Web-based information services for the general public. One of these is the colorful "Tox Town." Tox Town looks at an ordinary town and points out many harmful substances and environmental hazards that might exist there. Users can click on a town location, like the school, and see a colorful dollhouse-style cutaway view of that building. Toxic chemicals that might be found in the school are listed, along with links to selected Internet resources about school environments. There are similar cutaways for offices, factories, parks, and other locations. In 2004, NLM introduced a big city version with links to sources of toxic chemicals in an urban environment. Other settings, such as a farming region, are planned.

Another consumer information resource created by the Division of Specialized Information Services is the Household Products Database. This is a guide that provides easy-to-understand data on the potential health effects of more than 2,000 ingredients contained in more than 4,000 common household products. The database provides information on many of these substances and their potential health effects, in consumer-friendly language. The Household Products Database has proved to be popular with the media, and there have been a number of newspaper and magazine articles about it. For more technical information, users can launch a search for a product or ingredient from the product's page into NLM's TOXNET, a cluster of databases on toxicology, hazardous chemicals, and related information. The Division has also created a series of Web-based information services for specialized populations. Among these are American Indian Health, Arctic Health, and Asian American Health. These sites contain extensive information about diseases and conditions of special concern to those populations and links to organizations and government agencies that can provide assistance.

One special population that the NLM has emphasized is that of older Americans. Working together with the National Institute on Aging, NLM has created NIHSeniorHealth.gov and made it available through the Library's Web site. This site contains information in a format that is especially usable by seniors. For example, the site features large print and easy-to-read segments of information repeated in a variety of formats—such as open-captioned videos and short quizzes—to increase the likelihood it will be remembered. NIHSeniorHealth.gov has a "talking"

function, which allows users the option of reading the text or listening to it as it is read to them. The site has received much favorable attention in the press.

NLM's Lister Hill Center has introduced an information resource for the general public: the Genetics Home Reference. This database provides simple and understandable information about diseases and disorders that run in families. The need for such a resource has been heightened by the widely reported findings from the Human Genome Project which have greatly increased the public's interest in genetics. Thus, the decision by the NLM to create an online resource that combines understandable language with up-to-date data from research/medical resources. The integrated approach of Genetics Home Reference provides brief, consumer-friendly summaries of genetic conditions and related genes and chromosomes. Recognizing that the target audience may have a limited science background, the database also offers tools, such as a glossary and genetics tutorial, to help the motivated learner. Experts in human genetics evaluate the validity of information automatically selected from genomic databases and provide context from published biomedical research to synthesize a consumer-friendly presentation. The database has more than 100 condition summaries and 160 gene summaries and new content is being added continuously.

The demand for Visible Human anatomic images by medical researchers and educators has been steadily growing throughout the world. A new Web site, AnatQuest, has been developed under Lister Hill Center auspices to meet this demand and to provide new and visually compelling ways to bring anatomic images to a broad range of users, including the lay public. The site offers users thumbnails of the cross-section, sagittal and coronal images of the Visible Male and Female, from which full resolution views are accessed. In addition, a few hundred 3-D anatomic structures are provided. Users may zoom in and out as they navigate through the images. The project has the potential to generate improvements in the state-of-the-art that would benefit access to any image database, in the exploration of suitable models for linking term queries (and document text) to images, and in the development of system architectures for image processing and handling. NLM is now seeking ways to link the print library of functional-physiological knowledge with the image library of structural-anatomic knowledge into a single, unified resource for health information. This would add great value to text resources such as Medline/PubMed and MedlinePlus by linking to anatomic images.

## **SCIENCE ADVANCES**

### ***Bioinformatics***

The National Center for Biotechnology Information (NCBI), created at the National Library of Medicine in 1988, has grown tremendously in both the number and range of its programs and its importance to the day-to-day work of tens of thousands of scientists around the globe. As described above, the NCBI created Medline/PubMed, GenBank, PubMed Central, and other information services that are available freely on the Web. But the work of the Center is far-reaching. Prior to 1995, for example, biologists interested in studying the complete set of instructions for the building of an organism had access only to fragments of these instruction sets. For any given organism, only a portion of the genome, the DNA sequence containing the organism's instruction set, was known. To overcome the lack of sequence data, biologists were forced to fill in the gaps in their knowledge of the DNA sequences of one organism by using

sequences taken from other organisms. Recent breakthroughs in sequencing technology have resulted in a rapid accumulation of sequences for organisms ranging from bacteria to those of higher plants and animals. It is now usually possible to find a close relative of an organism of interest for which the full genomic sequence is available so that the entire set of genetic components can be studied as a whole.

Currently, complete genomes for over 180 bacteria and more than 20 higher organisms such as human, mouse, rat, chicken, zebrafish, fruit fly, honey bee, worm, a flowering plant, rice, and several varieties of yeast and other fungi are available in NCBI's GenBank database. This amounts to a snapshot of genomic blueprints for life covering a wide spectrum of variation and containing the vital information necessary for biologists to identify the key determinants of species variation. In addition, valuable clues as to the origin of human disease lie in the genomes of those species within which models of disease have been developed, such as the mouse and rat. To unlock the potential of a genomic sequence, however, requires complex computational tools that allow genomic information to be compared and contrasted between species. Fortunately, concurrently with the rapid accumulation of genomic sequence, an equally rapid development of the databases required to contain the data and the tools required to analyze it has also taken place at the NCBI. These new databases and computational tools are enabling scientists to harvest this abundance of genomic sequence.

Harvesting the knowledge implicit in a genomic sequence begins with its deposition into a public sequence database such as GenBank with its more than 37 million sequences from 165,000 species. Sequences entering GenBank go through a screening process to ensure that features of biological interest are properly annotated which is essential for cross-comparisons of sequences. After validation, the sequences and annotation are entered into the Entrez sequence search and retrieval system to enable researchers to extract complex subsets of the data easily for analysis. Commonly run analyses are performed in advance so that researchers can merely access the results rather than having to perform their own lengthy analyses. The speed and sensitivity of NCBI's BLAST and MegaBLAST programs have made sequence comparisons against large databases practical and has allowed NCBI to offer a variety of pre-computed comparisons between the protein and genomic sequences of the organisms in GenBank. Protein sequences, derived from genomic sequence by using the sequences of the encoded genes, are compared with one another routinely at NCBI to provide displays of species-specific similarities and protein-level whole genomic comparisons. Protein modules, or "domains," conserved across species are detected and linked to the corresponding protein records. Using the pre-computed analyses available for sequences through Entrez, a medical researcher can quickly determine if humans and mice share a protein, and therefore, a gene, implicated in a disease.

Genomes are said to be "annotated" when the locations of important features, such as genes and the regulatory DNA sequences that control them, are determined. The use of a consistent method of annotation for the genomes of the model organisms used in biomedical research allows researchers to make the detailed comparisons between them that lead to scientific discoveries. To help make such consistent annotations, NCBI creates reliable sequence standards, called "reference sequences," for genomes, chromosomes, genes and proteins. NCBI uses these reference sequences to search for genes in a variety of genomes ranging from the genomes of human, mouse, and rat to those of dangerous microbes and viruses such as Haemophilus

influenzae or the HIV-1 AIDS virus. In the case of microbial and viral genomes, these annotations allow NCBI tools to quickly detect the differences between a benign bacterium and a related pathogenic species that may lead to disease. Other tools allow researchers to see how protein sequences have changed between pathogenic and non-pathogenic species and help them to develop effective new drugs targeted at the molecular “Achilles heels” of the pathogens.

For large genomes, such as human, mouse, and rat, NCBI annotations are displayed within a versatile genomic viewer called the Map Viewer that allows direct comparisons to be made between multiple genomes. Researchers can focus on a region of interest and see, at a glance, how genes within the region are preserved from organism to organism. Databases such as the Entrez Gene database, the HomoloGene database of related groups of genes, and the “Online Mendelian Inheritance in Man” database of genetic diseases, are a click away in Map Viewer displays. This high degree of data integration allows researchers to move fluidly from organism to organism and from a genomic view to a clinical one. For example, if basic research has determined that a disease-causing genetic change lies in a particular region of the rat genome, it is a simple matter to use Map Viewer to determine which genes lie within the region. Map Viewer can then be used to see where the corresponding genes lie in the human genome, whether there are known mutations in these human genes, and whether any of the human genes is known to cause a human disease.

One service not previously described is the NCBI Bookshelf in which the Center is collaborating with authors and publishers to adapt biomedical books for the Web. The growing Bookshelf contains about 40 scientific texts, including a new one, *The Genetic Landscape of Diabetes*, created by NCBI staff. This book assists non-experts in finding reliable information on the genetics of diabetes. Created with expert advice from NIH scientists, it covers 19 genes that are risk factors for type 1 diabetes, 12 genes that are risk factors for type 2 diabetes, as well as discussing other rare types of diabetes and gestational diabetes. An introductory chapter also describes the history, epidemiology, and physiology of diabetes in general. All genes are presented in a similar way in the book: background information is provided first, followed by molecular information, including the size of the gene, location in the human genome, known mutations, and protein product structure. In these sections, there are links to all the relevant molecular databases, and live search links to PubMed, so that up-to-date information is always available. Furthermore, since *The Genetic Landscape of Diabetes* is an online resource, new candidate genes can be added to the book as they emerge. Multimedia components of the book include animations of maps of the United States showing the rise in obesity and diabetes, calculators for readers to calculate their own ideal body weight and body mass index (BMI), and links to videos of recent lectures given by researchers who have been invited to the NIH to discuss obesity and diabetes. *The Genetic Landscape of Diabetes* is the fastest growing NCBI database in terms of searches executed per day.

### ***Lister Hill National Center for Biomedical Communications***

NLM’s Lister Hill National Center for Biomedical Communications sponsors high-technology communications research projects in such areas as high quality imagery, medical language processing, high-speed access to biomedical information, developing intelligent database systems, multimedia visualization, data mining, and machine-assisted indexing. One prominent

area of research has been the Visible Human Project. The project consists of two enormous (50 gigabytes) data sets, one male and one female, of anatomical MRI, CT, and photographic cryosection images. These data sets are available through a free license agreement. More than 1,800 individuals and institutions in 47 countries have licensed the data and are using them in a wide range of educational, diagnostic, treatment planning, virtual reality, artistic, and industrial applications. An “Insight Toolkit” has been developed and makes available a variety of open source image processing algorithms for computing segmentation and registration of medical data. The Visible Human Web site is one of the most popular of all NLM’s Web offerings.

A new initiative of the Lister Hill Center is the Scalable Information Infrastructure (SII) program. Its purpose is to encourage the development of health-related applications of scalable, network aware, wireless, geographic information systems, and identification technologies in a networked environment. The initiative focuses on situations that require, or will greatly benefit from the application of these technologies in health care, medical decision-making, public health, large-scale health emergencies, health education, etc. FY 2004 began a three-year effort for eleven SII research contract awards made by the NLM.

### ***Unified Medical Language System and Standard Vocabulary for Electronic Health Records***

The National Library of Medicine’s Unified Medical Language System (UMLS) project develops and distributes multi-purpose electronic “Knowledge Sources” and associated lexical programs for system developers. The purpose of these UMLS databases and programs is to help computer systems behave as if they “understand” the meaning of the language of biomedicine and health. The UMLS Metathesaurus, the heart of the UMLS Knowledge Sources, contains more than 1 million concepts and 4.5 million unique concept names from more than 100 different biomedical vocabularies and classifications. In 2004, the Metathesaurus was expanded and enhanced to improve its ability to serve as a vehicle for uniform distribution of the administrative code sets required for electronic billing transactions and the clinical vocabularies recently designated as U.S. government-wide standards for electronic health records (EHRs). NLM licenses for U.S.-wide use, supports, or directly develops the three principal clinical vocabulary standards: SNOMED CT (Systematized Nomenclature of Medicine–Clinical Terms), LOINC (Logical Observation Identifiers, Names, Codes), and the RxNorm clinical drug vocabulary. Following NLM’s 2003 agreement with the College of American Pathologists to license SNOMED CT for use without charge throughout the U.S., both the English and Spanish versions of SNOMED CT were incorporated into the UMLS in 2004. Major changes and additions were made to the UMLS file structure, software tools, documentation, website, and distribution methods to support its role in disseminating clinical vocabulary standards.

The Federal government has announced plans to achieve always-current, always-available EHRs for most Americans within a decade. The lack of common, readily available electronic medical terminology standards has been a major obstacle to the widespread deployment and effective use of EHRs. Without such standards, merging and integrating data from many non-compatible patient data systems is nearly impossible. The national licensing of SNOMED CT and its uniform distribution with other clinical and administrative standards within the UMLS makes it possible for software vendors, health care providers, hospitals, insurance companies, public health departments, medical research facilities, and others to incorporate uniform terminology

into their information systems much more readily. This is an important step toward establishing interoperable electronic health records that can be made available wherever and whenever patients need treatment. In addition to improving the safety and quality of health care, standard electronic health data will assist in detecting and responding to public health emergencies and provide one of the key building blocks for a cost-effective national research infrastructure.

### ***Extramural Programs***

NLM's Extramural Programs are authorized by the Medical Library Assistance Act of 1965. The act (as amended and extended) authorizes the Library to award grants for research, training and fellowships, medical library assistance, improving access to information, and publications. For more than 20 years NLM has supported the training of medical informaticians at universities across the nation. In the early years the program focused on training of informaticians for clinical care. Today the training programs have added opportunities for training in bioinformatics, the field of biomedical computing for the large datasets characteristic of modern research. At present, NLM provides 18 grants to biomedical informatics training at 26 universities, supporting 250 trainees. NLM also participates in the NIH Roadmap activities, almost all of which have major emphasis on biomedical computing. For example, training is an important requirement of the National Centers for Biomedical Computing, an initiative for which NLM is one of the key leaders. Training as embedded in Roadmap activities is expected to become a significant complement to NLM's traditional support of informatics training.

## **SPECIAL INITIATIVES**

### ***Serving Special Communities***

With all these unique information resources, it becomes more and more important for the Library to engage in outreach to let citizens know what is available. The 5,000-member National Network of Libraries of Medicine is an important partner in these outreach endeavors. Many of the programs are directed at minority populations. For example, there are programs to assist in remedying the disparity in health opportunities experienced by African Americans, Latinos, Native Americans, senior citizens, and rural populations. One notable program is the "Listening Circle," a Native American/Alaska Native concept that enables an open dialog and exchange of perspectives and information between Native Americans and the NLM, in order to build mutual understanding and trust on which future collaborations can be based. It has proven to be an excellent means to identify needs and special opportunities for reducing health disparities, as defined by the actual people we intend to serve with NLM's outreach. NLM has participated in Listening Circles in North Dakota, Alaska, and Hawaii.

Under a program with the Historically Black Colleges and Universities (HBCUs), NLM is helping to train people to use information resources in dealing with environmental and chemical hazards. The latest aspect of this outreach effort is NLM's collaboration with the United Negro College Fund Special Programs Corporation to work with the HBCUs in the area of consumer health to encourage the use of reliable electronic health information (such as that provided by the NLM) by the public.

NLM also has been instrumental in reaching out to other countries around the world to help improve their access to scientific medical information. The oldest such program is that involving formal partnerships with major institutions in 20 countries. The NLM helps them obtain computerized access to the literature; the countries in turn help NLM receive the medical literature from that part of the world. The Library is also a key player in the Multilateral Initiative on Malaria, the multiagency effort to improve malaria research in African nations. NLM's role is to establish and maintain the first malaria research communications network, MIMCOM. There are now 19 research sites in 9 countries participating, with full access to the Internet.

### ***The NIH Roadmap***

The new NIH Roadmap Initiative has the potential to have a profound and positive impact on how American medical research is conducted. The NLM sees itself having an important role in the Initiative in three areas. Because the Roadmap recognizes that one of the most powerful and unifying concepts of 21<sup>st</sup> century biology is that of bioinformatics, the computerized bioinformatics databases and analysis tools of the NCBI will become even more central to the research enterprise. Second is the Roadmap's requirement to "re-engineer the national clinical research enterprise." NLM's leadership role in working with biomedical vocabularies—the Unified Medical Language System, the arrangement with the SNOMED clinical vocabulary, and NLM's expanding the NIH clinical trials database—are all key aspects of improving clinical research. Finally, the Roadmap articulates NIH's responsibility to communicate research results to improve the quality of life for all people. The Library has a central role in collecting and communicating these results through Web-based information services and online databases.

Another Roadmap-related project being undertaken by the National Center for Biotechnology Information is the PubChem suite of databases. PubChem is NIH's Small Molecule Repository which is a component of the NIH Roadmap initiative for the creation of chemical genomics screening centers. Small molecules are responsible for the most basic chemical processes that are essential for life. Considering their basic role in the cell, it is not surprising that small molecules often play an essential role in the attack of a pathogen, or in the cell's response to the attack. Most therapeutic drugs are small molecules that interact with, and influence the behavior of macromolecules. It is therefore of great importance to link small molecules and their chemistry to the structures of large macromolecules, such as the protein and DNA structures found in NCBI's Molecular Modeling Database (MMDB) as well as to other biological databases such as NCBI's PubMed database of scientific literature. At present, PubChem is comprised of almost 900,000 records for small molecules obtained from several publicly available resources. Ultimately, as it acquires the massive amounts of bioactivity data that will be generated by screening centers, PubChem will be an essential tool for unraveling the complex web of metabolic interactions and signaling pathways that allows cells to function.

### ***FY 2005 Health IT Proposal***

The President has established a goal to make secure Electronic Health Records (EHRs), available to the majority of Americans. To accomplish this, a variety of concomitant challenges and barriers must be addressed. In FY 2005, under the authority of Section 208 of the Departments

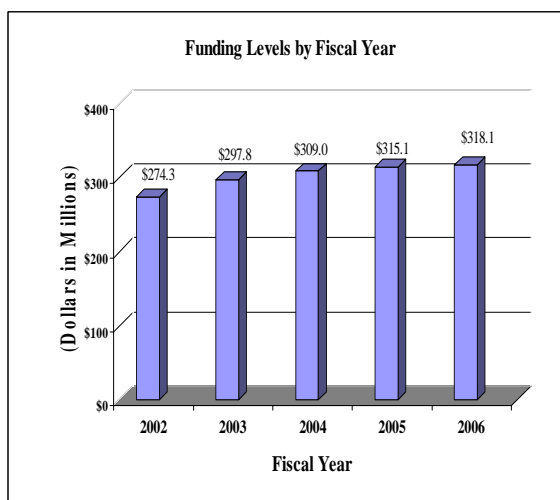
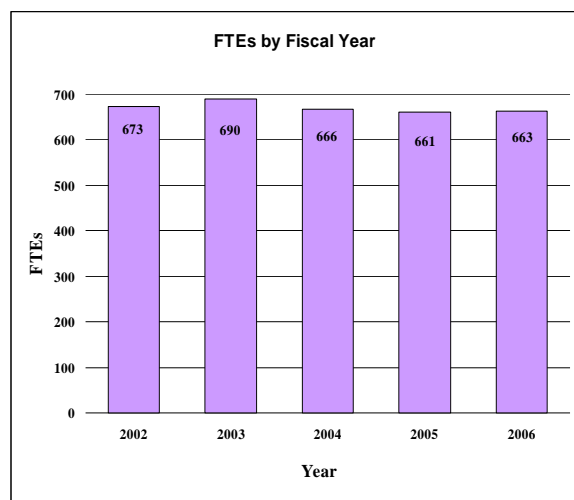


of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 2005, \$9.349 million will be transferred among the NIH Institutes and Centers to the National Library of Medicine (NLM), which will be combined with \$151,000 from the NLM. Working together with the Office of the National Health Information Technology Coordinator (ONCHIT), NLM will accelerate the development of interoperability standards and prototypes for the secure exchange of electronic health records. Prototypes will be developed through contracts to public-private consortia that will demonstrate the ability to build and operate the National Health Information Network (NHIN). In recent years, NLM has funded important standards development and implementation initiatives through its other programs and will play an important role as a collaborator with HHS in ensuring the adoption of standards to create an interoperable NHIN.

### NLM BUDGET POLICY

The Fiscal Year 2006 budget request for the NLM is \$318,091,000 an increase of \$2,945,000 and 0.9 percent over the FY 2005 Appropriation. Also included in the FY 2006 request, is NLM's support for the trans-NIH Roadmap initiatives, estimated at 0.89% of the FY 2006 budget request. This Roadmap funding is distributed through the mechanisms of support, consistent with the anticipated funding for the Roadmap initiatives. A full description of this trans-NIH program may be found in the NIH Overview.

A five year history of FTEs and Funding Levels for NLM is shown in the graphs below.

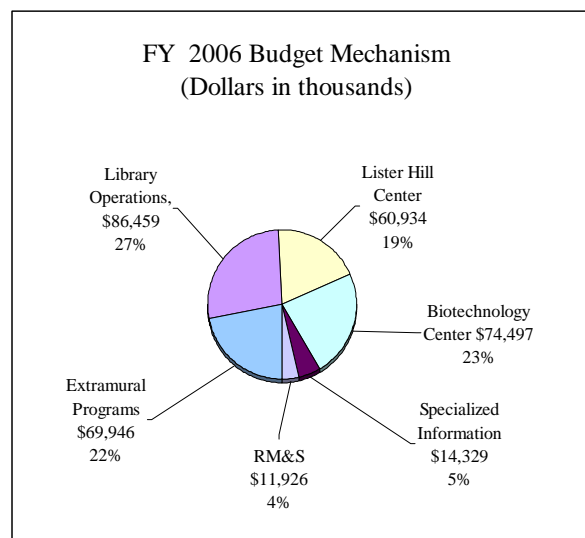


The request continues to support health care applications; improve consumer health initiatives; utilize advanced computer and communications technologies; emphasize support for library operations including literature acquisition, management dissemination, and preservation; funds grants in Integrated Advanced Information Management Systems, training, medical informatics, biotechnology and other research and development activities. Also included in the request are increased resources to expand the scope of PubMed Central to provide access and sharing of peer-reviewed research publications generated with NIH support as shown below.

<b>NLM Public Access Costs</b>		
(\$ in millions)		
	<b><u>FY 2005</u></b>	<b><u>FY 2006</u></b>
Personnel	\$0.5	\$0.6
Hardware/Software	\$0.2	\$0.1
Document XML Formatting	<u>\$0.9</u>	<u>\$2.2</u>
<b>Total</b>	\$1.6	\$2.9

NIH estimates that the Public Access policy will cost \$1.6M for FY 2005 and \$2.9M for FY 2006. These estimates include costs for basic personnel, hardware/software acquisition and maintenance, and markup of the documents with XML formatting codes. The portion of the estimate most subject to change is the cost of document formatting. This cost is derived from estimated costs of \$30 to \$35 per article times the number of articles submitted to the archive. The number of articles produced by NIH grantees is estimated at between 60,000 and 70,000 per year. The estimate is based on processing 27,000 manuscripts for FY 2005 and 65,000 manuscripts for FY 2006 at \$34 per manuscript. Formatting costs will be reduced proportionately for lower numbers of manuscripts received. Formatting costs could also be reduced if publishers provide a copy of their final publication version to be substituted for the authors' final manuscript version. Note that the above costs are incremental costs over the current production costs of PubMed Central which already has over 300,000 journal articles and is expected to add another 500,000 in the next year in addition to those resulting from the Public Access policy.

The FY 2006 budget request for NLM by budget activity is illustrated below:



**NATIONAL INSTITUTES OF HEALTH**

National Library of Medicine

Budget Mechanism - Total

MECHANISM	FY 2004 Actual		FY 2005 Appropriation		FY 2006 Estimate	
	No.	Amount	No.	Amount	No.	Amount
Grants:						
Noncompeting	133	\$41,832,000	145	\$46,621,000	125	\$40,450,000
Competing	76	13,734,000	40	9,735,000	64	15,620,000
SBIR/STTR	4	728,000	7	660,000	7	647,000
Subtotal, Grants	213	56,294,000	192	57,016,000	196	56,717,000
Contracts:						
Noncompeting	8	12,884,000	8	12,942,000	0	0
Competing	7	419,000	7	510,000	15	13,229,000
Subtotal, Contracts	15	13,303,000	15	13,452,000	15	13,229,000
Total, Extramural	228	69,597,000	207	70,468,000	211	69,946,000
Intramural Programs:	<u>FTEs</u>		<u>FTEs</u>		<u>FTEs</u>	
Library Operations	335	81,695,000	330	84,934,000	330	86,459,000
Lister Hill Center	78	60,674,000	72	61,318,000	72	60,934,000
Biotechnology Center	143	71,073,000	148	72,485,000	150	74,497,000
Specialized Information	34	14,156,000	31	14,338,000	31	14,329,000
Total, Intramural	590	227,598,000	581	233,075,000	583	236,219,000
Research management and support	76	11,281,000	80	11,603,000	80	11,926,000
Total, NLM	666	308,476,000	661	315,146,000	663	318,091,000
(RoadMap Support)		(1,062,000)		(1,992,000)		(2,844,000)

**NATIONAL INSTITUTES OF HEALTH**  
National Library of Medicine Budget Mechanism  
Reflecting Planned Re-allocations and Transfers Related to  
Influenza, Health Information Technology and Anthrax Antibiotics  
(Dollars in Thousands)

MECHANISM	FY 2004 Actual		FY 2005				FY 2006 Revised	
	No.	Amount	Enacted		Revised		No.	Amount
Grants:								
Noncompeting	133	\$41,832	145	\$46,621	145	\$46,621	125	\$40,450
Competing	76	13,734	40	9,735	40	9,735	64	15,620
SBIR/STTR	4	728	7	660	7	660	7	647
Subtotal, Grants	213	56,294	192	57,016	192	57,016	196	56,717
Contracts:								
Noncompeting	8	12,884	8	12,942	8	12,942	0	0
Competing	7	419	7	510	7	510	15	13,229
Subtotal, Contracts	15	13,303	15	13,452	15	13,452	15	13,229
Total, Extramural	228	69,597	207	70,468	207	70,468	211	69,946
Intramural Programs:								
Library Operations	335	81,695	330	84,934	330	86,934	330	86,459
Lister Hill Center	78	60,674	72	61,318	72	68,667	72	60,934
Biotechnology Center	143	71,073	148	72,485	148	72,485	150	74,497
Specialized Information	34	14,156	31	14,338	31	14,338	31	14,329
Total, Intramural	590	227,598	581	233,075	581	242,424	583	236,219
Research management and support	76	11,281	80	11,603	80	11,603	80	11,926
Total, NLM	666	308,476	661	315,146	661	324,495	663	318,091
(RoadMap Support)		(1,062)		(1,992)		(1,992)		(2,844)

**NATIONAL INSTITUTES OF HEALTH**

**National Library of Medicine  
Budget Authority by Activity  
(dollars in thousands)**

ACTIVITY	FY 2004 Actual		FY 2005 Appropriation		FY 2006 Estimate		Change	
	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount
Extramural Programs:								
Medical Library Assistance		\$39,072		\$39,247		\$38,903		(344)
PHS 301		29,797		30,561		30,396		(165)
SBIR/STTR		728		660		647		(13)
Subtotal, Extramural		69,597		70,468		69,946		(522)
Intramural Programs:								
Library Operations	335	81,695	330	84,934	330	86,459	0	1,525
Lister Hill Center	78	60,674	72	61,318	72	60,934	0	(384)
Biotechnology Center	143	71,073	148	72,485	150	74,497	2	2,012
Specialized Information	34	14,156	31	14,338	31	14,329	0	(9)
Subtotal, Intramural	590	227,598	581	233,075	583	236,219	2	3,144
Research management and support	76	11,281	80	11,603	80	11,926	0	323
<b>Total</b>	<b>666</b>	<b>308,476</b>	<b>661</b>	<b>315,146</b>	<b>663</b>	<b>318,091</b>	<b>2</b>	<b>2,945</b>

**NATIONAL INSTITUTES OF HEALTH**  
**National Library of Medicine**

**Summary of Changes**

FY 2005 Estimate		\$315,146,000		
FY 2006 Estimated Budget Authority		318,091,000		
Net change		2,945,000		
CHANGES	FY 2005 Appropriation		Change from Base	
	FTEs	Budget Authority	FTEs	Budget Authority
<b>A. Built-in:</b>				
1. Intramural research:				
a. Within grade increase		\$57,062,000		\$969,000
b. Annualization of January 2005 pay increase		57,062,000		528,000
c. January 2006 pay increase		57,062,000		984,000
d. One less day of pay		57,062,000		(219,000)
e. Payment for centrally furnished services		9,421,000		47,000
f. Increased cost of laboratory supplies, materials, and other expenses		166,592,000		4,272,000
Subtotal				6,581,000
2. Research Management and Support:				
a. Within grade increase		7,997,000		135,000
b. Annualization of January 2005 pay increase		7,997,000		74,000
c. January 2006 pay increase		7,997,000		138,000
d. One less day of pay		7,997,000		(30,000)
e. Payment for centrally furnished services		0		0
f. Increased cost of laboratory supplies, materials, and other expenses		3,606,000		29,000
Subtotal				346,000
Subtotal, Built-in				6,927,000

**NATIONAL INSTITUTES OF HEALTH  
National Library of Medicine**

**Summary of Changes--continued**

CHANGES	2005 Current Estimate Base		Change from Base	
	No.	Amount	No.	Amount
B. Program:				
1. Research project grants:				
a. Noncompeting	145	\$46,621,000	(20)	(\$6,171,000)
b. Competing	40	\$9,735,000	24	\$5,885,000
c. SBIR/STTR	7	\$660,000	0	(\$13,000)
Total	192	57,016,000	4	(299,000)
2. Research and development contracts	15	13,452,000	0	(223,000)
Subtotal, extramural				(522,000)
3. Intramural research	<u>FTEs</u> 581	233,075,000	<u>FTEs</u> 2	(3,437,000)
4. Research management and support	80	11,603,000	0	(23,000)
Subtotal, program		315,146,000		(3,982,000)
Total changes	661		2	2,945,000

**NATIONAL INSTITUTES OF HEALTH**  
**National Library of Medicine**

**Budget Authority by Object**

	FY 2005 Appropriation	FY 2006 Estimate	Increase or Decrease
Total compensable workyears:			
Full-time employment	661	663	2
Full-time equivalent of overtime & holiday hours	4	4	0
Average ES salary	\$146,637	\$150,010	\$3,373
Average GM/GS grade	10.6	10.6	0.0
Average GM/GS salary	\$70,869	\$72,499	\$1,630
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$92,346	\$94,470	\$2,124
Average salary of ungraded positions	104,354	106,754	2,400
<b>OBJECT CLASSES</b>	FY 2005 Appropriation	FY 2006 Estimate	Increase or Decrease
Personnel Compensation:			
11.1 Full-Time Permanent	\$34,909,000	\$36,340,000	\$1,431,000
11.3 Other than Full-Time Permanent	14,754,000	15,359,000	605,000
11.5 Other Personnel Compensation	1,695,000	1,764,000	69,000
11.7 Military Personnel	219,000	228,000	9,000
11.8 Special Personnel Services Payments	1,383,000	1,500,000	117,000
<b>Total, Personnel Compensation</b>	<b>52,960,000</b>	<b>55,191,000</b>	<b>2,231,000</b>
12.0 Personnel Benefits	12,019,000	12,431,000	412,000
12.1 Military Personnel Benefits	80,000	83,000	3,000
13.0 Benefits for Former Personnel	0	0	0
<b>Subtotal, Pay Costs</b>	<b>65,059,000</b>	<b>67,705,000</b>	<b>2,646,000</b>
21.0 Travel & Transportation of Persons	1,330,000	1,313,000	(17,000)
22.0 Transportation of Things	126,000	124,000	(2,000)
23.1 Rental Payments to GSA	3,000	3,000	0
23.2 Rental Payments to Others	379,000	374,000	(5,000)
23.3 Communications, Utilities & Miscellaneous Charges	1,550,000	1,530,000	(20,000)
24.0 Printing & Reproduction	713,000	704,000	(9,000)
25.1 Consulting Services	44,584,000	43,960,000	(624,000)
25.2 Other Services	39,166,000	41,285,000	2,119,000
25.3 Purchase of Goods & Services from Government Accounts	42,096,000	41,707,000	(389,000)
25.4 Operation & Maintenance of Facilities	282,000	278,000	(4,000)
25.5 Research & Development Contracts	31,589,000	31,016,000	(573,000)
25.6 Medical Care	0	0	0
25.7 Operation & Maintenance of Equipment	11,882,000	11,730,000	(152,000)
25.8 Subsistence & Support of Persons	0	0	0
<b>25.0 Subtotal, Other Contractual Services</b>	<b>169,599,000</b>	<b>169,976,000</b>	<b>377,000</b>
26.0 Supplies & Materials	1,768,000	1,745,000	(23,000)
31.0 Equipment	21,532,000	22,247,000	715,000
32.0 Land and Structures	3,000	3,000	0
33.0 Investments & Loans	0	0	0
41.0 Grants, Subsidies & Contributions	53,077,000	52,360,000	(717,000)
42.0 Insurance Claims & Indemnities	0	0	0
43.0 Interest & Dividends	7,000	7,000	0
44.0 Refunds	0	0	0
<b>Subtotal, Non-Pay Costs</b>	<b>250,087,000</b>	<b>250,386,000</b>	<b>299,000</b>
<b>Total Budget Authority by Object</b>	<b>315,146,000</b>	<b>318,091,000</b>	<b>2,945,000</b>



**NATIONAL INSTITUTES OF HEALTH  
National Library of Medicine**

**Salaries and Expenses**

OBJECT CLASSES	FY 2005 Appropriation	FY 2006 Estimate	Increase or Decrease
<b>Personnel Compensation:</b>			
Full-Time Permanent (11.1)	\$34,909,000	\$36,340,000	\$1,431,000
Other Than Full-Time Permanent (11.3)	14,754,000	15,359,000	605,000
Other Personnel Compensation (11.5)	1,695,000	1,764,000	69,000
Military Personnel (11.7)	219,000	228,000	9,000
Special Personnel Services Payments (11.8)	1,383,000	1,500,000	117,000
<b>Total Personnel Compensation (11.9)</b>	<b>52,960,000</b>	<b>55,191,000</b>	<b>2,231,000</b>
Civilian Personnel Benefits (12.1)	12,019,000	12,431,000	412,000
Military Personnel Benefits (12.2)	80,000	83,000	
Benefits to Former Personnel (13.0)	0	0	0
<b>Subtotal, Pay Costs</b>	<b>65,059,000</b>	<b>67,705,000</b>	<b>2,646,000</b>
Travel (21.0)	1,330,000	1,313,000	(17,000)
Transportation of Things (22.0)	126,000	124,000	(2,000)
Rental Payments to Others (23.2)	379,000	374,000	(5,000)
Communications, Utilities and Miscellaneous Charges (23.3)	1,550,000	1,530,000	(20,000)
Printing and Reproduction (24.0)	713,000	704,000	(9,000)
<b>Other Contractual Services:</b>			
Advisory and Assistance Services (25.1)	44,584,000	43,960,000	(624,000)
Other Services (25.2)	39,166,000	41,285,000	2,119,000
Purchases from Govt. Accounts (25.3)	25,898,000	25,462,000	(436,000)
Operation & Maintenance of Facilities (25.4)	282,000	278,000	(4,000)
Operation & Maintenance of Equipment (25.7)	11,882,000	11,730,000	(152,000)
Subsistence & Support of Persons (25.8)	0	0	0
<b>Subtotal Other Contractual Services</b>	<b>121,812,000</b>	<b>122,715,000</b>	<b>903,000</b>
Supplies and Materials (26.0)	1,768,000	1,745,000	(23,000)
<b>Subtotal, Non-Pay Costs</b>	<b>127,678,000</b>	<b>128,505,000</b>	<b>827,000</b>
<b>Total, Administrative Costs</b>	<b>192,737,000</b>	<b>196,210,000</b>	<b>3,473,000</b>

## NATIONAL INSTITUTES OF HEALTH

### National Library of Medicine

#### SIGNIFICANT ITEMS IN HOUSE AND SENATE APPROPRIATIONS COMMITTEE REPORTS

##### FY 2005 House Appropriations Committee Report Language (H. Rpt. 108-646)

###### Item

***PubMed Central*** – The Committee commends NLM for its leadership in developing PubMed Central, an electronic online repository for life science articles. Because of the high level of expertise health information specialists have in the organization, collection, and dissemination of medical information, the Committee believes that health sciences librarians have a key role to play in the further development of PubMed Central. The Committee encourages NLM to work with the medical library community regarding issues related to copyright, fair use, peer-review and classification of information on PubMed Central. (p. 104)

###### Action taken or to be taken

NLM considers interaction and input from the medical library community essential for the development and continued success of PubMed Central (PMC). The PMC National Advisory Committee advises the Directors of NIH, NLM, and the National Center for Biotechnology Information (NCBI) on the content and operation of the PMC repository. A primary charge of the committee is to ensure that PMC remains responsive to the needs of researchers, librarians, publishers, and the general public. Medical librarians have played an active role in the committee since its inception. The committee currently is chaired by James Williams, Dean, University Libraries at the University of Colorado at Boulder, and includes three other librarians: Paula Kaufman, University Librarian and Professor of Library Administration at the University of Illinois at Urbana-Champaign; Sarah Thomas, Karl A. Kroch University Librarian at Cornell University; Linda Watson, president of the Medical Library Association in 2002-2003, and Director, Claude Moore Health Sciences Library at the University of Virginia. A fifth member of the 15-person committee is Richard Johnson, Enterprise Director of The Scholarly Publishing & Academic Resources Coalition (SPARC), an alliance of libraries, research institutions and other organizations actively exploring ways to expand access to top-quality research literature.

Acting on a recommendation from the librarians and other members of the PMC committee, NLM is currently engaged in digitizing the back issues of the journals in PMC in order to make complete runs of these journals available online. In November 2003 the Bulletin of the Medical Library Association, dating back to 1911, became the first such archive freely available to the public. In the past year, this program has provided online access to more than 190,000 articles previously available only in print issues of journals. We expect an equal or greater number of articles to be added to this online back-issue collection in the coming year. Medical librarians and the larger health sciences community have applauded the vastly improved access to this material. The permanent availability of this information online also allows local libraries to reduce their own print collections of these materials, thus freeing up resources in a time of tight

budgets. The success of this project has led the Wellcome Trust in the UK to sponsor the digitization of an additional set of journals of historical significance, with the digital copies to be included in PMC.

In addition to the advisory committee, the NCBI's PMC development team (which includes medical librarians) interacts with the user and publisher community in a variety of ways. These include presentations at library and publishing professional meetings, email exchanges from the PMC website and a new series of advanced NCBI Field Guide courses which target technical users of PubMed and PMC. NCBI also maintains an extensive outreach and educational program with medical library partners offering both beginning and advanced courses and training of bioinformatics specialists for medical libraries.

#### Item

**Minority health.**--The Committee encourages NLM to enhance its support of annual conferences sponsored by the minority health professions community designed to foster increased interest among minority students in the fields of biomedical science and bio-informatics. (p. 104)

#### Action taken or to be taken

NLM continues to support minority focused conferences. NLM provides support to the Minority Health Professions Biomedical Symposium which is intended to help expose minority high school and college students to the biomedical professions. In addition to providing funding to support attendance by these students, NLM conducts a training class in the use of electronic health information resources as provides demonstrations of these products. NLM also helps to support conferences of other organizations such as the National Medical Association, National Hispanic Medical Association, and the Latino and American Indian, Alaskan Native, Native Hawaiian Caucuses of the American Public Health Association. NLM also provides support and an annual training course to the Ghana mission of the Student National Medical Association, and supports a trip to Washington, DC to minority high school and college students from Columbia, MS in conjunction with a project in association with a grass roots environmental organization (Jesus People Against Pollution). Finally, as part of its tribal internship program, NLM supports the attendance of the tribal interns at conferences and meetings of their choice during the course of their internship year. NLM intends to continue to support minority focused conferences and assist students in attending those conferences. In addition, NLM seeks out other ways to foster the interest of minority students in biomedical professions.

#### FY 2005 Senate Appropriations Committee Report Language (S. Rpt. 108-345)

#### Item

**Computational Science** – The Committee recognizes that advances in computer science and technology, and applications of those advances to biomedical research, underpin many of the remarkable advances in the life sciences that have been achieved during the last couple of decades. Biomedical research now involves not only experiment, but also extensive computation. Increasingly, shortcomings in the specific biomedical computing environment limit the rate of progress in biomedical research. Accordingly, the Committee believes that a major effort must be undertaken to improve the ability of computation to serve biomedical

research. The Committee urges that NIH develop a plan for the near, intermediate, and long term, to improve the biomedical computing environment to the point that inefficiencies in the use of computer power and information technology no longer limit the rate of progress in biomedical research. The Committee recognizes that expertise relevant to the development and implementation of such a plan resides in other agencies as well as the NIH, such as the National Science Foundation, the Department of Energy, DARPA, and others, and thus encourages the NIH work with all such agencies in the development and implementation of such a plan. (p.161)

#### Action taken or to be taken

The application of computation to basic biomedical research and to applied research in the clinic has long been the major theme for NLM's extramural research grants and contracts, as well as for its intramural R&D activities.

Initiatives in applying computer science to biomedicine include:

- Training programs specifically designed to train computational specialists capable of developing and applying computational tools for biomedical purposes. At present, NLM supports approximately 300 biomedical informatics trainees are being supported at almost 30 university training sites distributed across the nation. The number of training sites and training slots was recently increased in recognition of the increasing demand for computational specialists.
- Grant support for research projects focused on applications of computer science to a broad variety of areas, development of computational tools for basic scientists, natural language processing systems, computer-based decision support and safety enhancers for clinical information systems, use of information technology to evaluate health outcomes among others.
- Grant support for important computational resources such as the Biological Magnetic Resonance Data Bank, Protein Databank, and other databases of wide general utility for researchers.
- Research contracts addressing computational infrastructure issues such as Internet 2, telemedicine, Visible Human, and Unified Medical Language System. New requests for research proposals are issued as new key computational problems are identified.
- Sponsorship, alone or with others, of workshops to bring together biologists, computer scientists, and informaticians to explore common problems and expand possibilities for interdisciplinary research. The computer science and biomedical communities, historically separate, must be encouraged to work together for the biomedical research of the future.
- Support for meetings of societies and special interest groups specifically interested in increasing application and value of biomedical computation.

- Participation in trans-NIH activities focused on computation, such as the Biomedical Information Science and Technology Initiative (BISTI) and NIH Roadmap; NLM has responsibility for program direction of one of the four National Centers for Biomedical Computing currently funded by NIH. These Centers are expected to provide sophisticated computational support for a wide variety of investigators.
- Participation with other NIH Institutes and other Agencies in such computationally intensive initiatives as Digital Libraries, Pharmacogenetics, Multi-Scale Modeling, and Interdisciplinary Center Planning grants.

Item

***Native Hawaiian Healing*** – The Committee encourages the preservation and documentation of Native Hawaiian traditional cultural healing practices. (p. 162)

Action taken or to be taken

In FY 2004, the NLM arranged and participated in several “listening circles” with Native Hawaiians and with American Indians and Alaska Natives. The need for preservation and documentation of traditional cultural healing practices was one of the issues of concern that were raised in the listening circles. In FY 2005, NLM has begun the process of seeking input from Native Hawaiians and other Native peoples to determine how it can best assist in documenting traditional cultural healing practices. Possible actions include adding published and unpublished materials to the NLM collection or the collections of other libraries in the National Network of Libraries of Medicine, oral or video history interviews with Native elders, and creation of online and/or physical exhibitions, perhaps in cooperation with the National Museum of the American Indian. Additional advice from Native Hawaiians and research on the extent of existing documentary evidence are needed before specific plans can be developed.

Item

***NLM Research Facility*** – The Committee was pleased to learn that the design for the new research facility at the NLM has been completed and urges the NIH to assign a high priority to this construction project. The National Center for Biotechnology Information is the leveraging resource for much of the science that NIH supports. The information-handling capabilities of the Center are being jeopardized by a lack of adequate facilities, and for the good of biomedical research this expansion of NLM is needed as soon as possible. (p. 162)

Action taken or to be taken

The NIH, supported by the recommendations of its Facilities Working Group, has included it in the overall NIH strategic facilities plan as a long term proposed project.

Item

***Senior Citizen Outreach*** – The Committee is very pleased with the excellent work by NLM to expand access to NLM’s databases by senior citizens, and it urges the Library to continue this worthwhile effort. (p. 162)

### Action taken or to be taken

The NLM remains committed to making health information on the Internet easily available to all citizens – especially older Americans. NLM’s interest in reaching older Americans is due, in part, to the finding that: 1) seniors represent the fastest growing segment of Internet users; and 2) high-risk seniors with multiple chronic diseases, particularly those representing low socio-economic status, could greatly benefit from accessing and understanding quality health information on the Internet. Also, as the baby-boomer generation approaches, this will have a critical impact on the range of issues surrounding access and understanding of health information on the Internet. To better meet the growing information needs of seniors, the NLM and the National Institutes on Aging (NIA) have developed <http://NIHSeniorHealth.gov>– a new website that is compatible with cognitive, visual and perceptual changes that occur with age. This new site was beta-tested in late 2002 and early 2003 and launched in a congressional event on Capitol Hill in October 2003. Efforts are now underway to work with other NIH Institutes to assist them in the transfer of vital health information into this new senior-friendly format. Dozens of new health topics of interest to older Americans and their caregivers will be added to NIHSeniorHealth.gov in 2005.

In addition to developing a senior-friendly website, the NLM also remains dedicated to increasing the access seniors have to good health information. Therefore, NLM is partnering with the American College of Physicians Foundation and the American Medical Association Foundation to sensitize patients about the availability of MedlinePlus.gov – NLM’s free comprehensive, authoritative health information website. Participating internists are writing “Information Prescriptions” directing their patients to MedlinePlus.gov as a source of health information on the Internet. Research shows that the public is eager to obtain good sources of health information on the web and are more likely to trust a website that has been recommended by their physician.

To increase access and use of the Internet for health-related information, The NLM will also be looking at ways to encourage the development of training opportunities for seniors at libraries, senior centers, and in senior housing programs across the country in 2005.

**NATIONAL INSTITUTES OF HEALTH  
National Library of Medicine**

**Authorizing Legislation**

	PHS Act/ Other Citation	U.S. Code Citation	2005 Amount Authorized	FY 2005 Appropriation	2006 Amount Authorized	2006 Budget Estimate
Research and Investigation	Section 301	42§241	Indefinite	} \$315,146,000	Indefinite	} \$318,091,000
National Library of Medicine	Section 41B	42§285b	Indefinite		Indefinite	
National Research Service Awards	Section 487(d)	42§288	<u>a/</u>	0		0
<b>Total, Budget Authority</b>				<b>315,146,000</b>		<b>318,091,000</b>

a/ Amounts authorized by Section 301 and Title IV of the Public Health Act.

**NATIONAL INSTITUTES OF HEALTH  
National Library of Medicine**

**Appropriations History**

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation <u>1/</u>
1997	143,268,000 2/	146,738,000	145,164,000 2/	151,103,000 3/
1998	152,689,000 2/	161,171,000	159,411,000 2/	161,185,000
1999	170,738,000	176,492,000	181,309,000	180,742,000
Rescission				(120,000)
2000	185,654,000 2/	202,027,000	210,183,000	215,214,000
Rescission				(1,146,000)
2001	230,135,000 2/	256,281,000	256,953,000	246,801,000
Rescission				(399,000)
2002	275,725,000	273,610,000	281,584,000	277,658,000
Rescission				(1,567,000)
2003	313,534,000	313,534,000	331,443,000	302,099,000
Rescission				(1,964,000)
2004	315,401,000	315,401,000	319,396,000	311,635,000
Rescission				(2,520,000)
2005	316,947,000	316,947,000	316,900,000	317,947,000
Rescission				(2,801,000)
2006	318,091,000			

1/ Reflects enacted supplementals, rescissions, and reappropriations.

2/ Excludes funds for HIV/AIDS research activities consolidated in the NIH Office of AIDS Research.

3/ Excludes enacted administrative reductions of \$275,000.



**NATIONAL INSTITUTES OF HEALTH  
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**Detail of Full-Time Equivalent Employment (FTEs)**

OFFICE/DIVISION	FY 2004 Actual	FY 2005 Appropriation	FY 2006 Estimate
Division of Library Operations	335	330	330
Lister Hill Nat'l Ctr. For Biomedical Com	78	72	72
National Center for Biotechnology Info.	143	148	150
Div. of Specialized Information Services	34	31	31
Office of the Director/Administration	65	66	66
Division of Extramural Programs	11	14	14
<b>Total</b>	<b>666</b>	<b>661</b>	<b>663</b>
FTEs supported by funds from Cooperative Research and Development Agreements	(0)	(0)	(0)
FISCAL YEAR	Average GM/GS Grade		
2002	10.2		
2003	10.5		
2004	10.6		
2005	10.6		
2006	10.6		

**NATIONAL INSTITUTES OF HEALTH  
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**Detail of Positions**

GRADE	FY 2004 Actual	FY 2005 Appropriation	FY 2006 Estimate
Total - ES Positions	5	5	5
Total - ES Salary	\$716,702	\$733,186	\$750,049
GM/GS-15	31	31	31
GM/GS-14	46	46	46
GM/GS-13	106	106	106
GS-12	130	130	130
GS-11	27	27	27
GS-10	3	3	3
GS-9	32	32	32
GS-8	77	77	77
GS-7	29	29	29
GS-6	12	12	12
GS-5	7	7	7
GS-4	24	24	24
GS-3	10	10	10
GS-2	4	4	4
GS-1	1	1	1
Subtotal	539	539	539
Grades established by Act of July 1, 1944 (42 U.S.C. 207):			
Assistant Surgeon General			
Director Grade	1	1	1
Senior Grade	1	1	1
Full Grade			
Senior Assistant Grade			
Assistant Grade			
Subtotal	2	2	2
Ungraded	131	138	140
Total permanent positions	505	500	500
Total positions, end of year	677	676	678
Total full-time equivalent (FTE) employment, end of year	666	661	663
Average ES salary	\$143,340	\$146,637	\$150,010
Average GM/GS grade	10.6	10.6	10.6
Average GM/GS salary	\$68,334	\$70,869	\$72,499

**NATIONAL INSTITUTES OF HEALTH  
National Library of Medicine**

**New Positions Requested**

	FY 2006		
	Grade	Number	Annual Salary
Senior Staff Scientists	Ungraded	2	\$110,000
Total Requested		2	

