DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

NATIONAL LIBRARY OF MEDICINE

BOARD OF REGENTS

MINUTES OF THE 108TH MEETING

JANUARY 24-25, 1995

BOARD ROOM

NATIONAL LIBRARY OF MEDICINE

BETHESDA, MARYLAND

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE

THE BOARD OF REGENTS OF THE NATIONAL LIBRARY OF MEDICINE

Minutes of Meeting [1][2]
January 24-25, 1995

The Board of Regents of the National Library was convened for its one-hundred-and-eighth meeting at 9:00 a.m. on Tuesday, January 24, 1995, in the Board Room of the National Library of Medicine, Bethesda, Maryland. Dr. H. Kenneth Walker, Professor of Medicine at Emory University School of Medicine, chaired the meeting. In accordance with P.L. 92-463 and the Determination of the Director, NIH, as announced, the meeting was open to the public from 9:00 a.m. to 4:30 p.m. on January 24 and from 9:00 a.m. to 12:00 noon on January 25. The meeting was closed from 4:30 to 4:45 p.m. on January 24 for the review, discussion, and evaluation of grant applications. A Board roster is enclosed under Attachment A.

Board members present were:

Dr. H. Kenneth Walker, Chair
Ms. Beverly E. Allen
Dr. Mary E. Clutter
Dr. Edwin Cortez
Dr. Michael E. DeBakey

Dr. Robert J. Joynt
Dr. Carol M. Newton
Dr. George H. Nolan
Dr. Steven J. Phillips

Alternates to ex officio members present were:

Ms. Wendy Carter, representing Dr. Kenneth W. Kizer.
Col. Emmanuel Cassimatis, representing Lt. Gen. Alcide M. LaNoue.
Capt. David S. Kemp, representing Vice Adm. Donald F. Hagen.
Dr. Kathleen A. McCormick, representing Dr. Audrey F. Manley.
Ms. Marie S. Pisa, representing Ms. Pamela Q.J. Andre.
Dr. Richard Rowberg, representing Dr. James H. Billington.
Dr. Michael Sheridan, representing Dr. James A. Zimble.
Col. Theodore F. Yurkosky, representing Lt. Gen. Edgar R. Anderson.

Board Members Absent:

Dr. Marion Ball
Ms. Naomi C. Booker

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[1]/ For the record, it is noted that members absent themselves from the meeting when the Board is discussing applications (a) from their respective institutions or (b) in which a conflict of interest might occur. This procedure applies only to individual discussion of an application and not to "en bloc" actions.

[2]/ The Board of Regents, when considering the extramural programs of NLM, also constitutes and serves as the National Libraries Assistance Advisory Board.

National Library of Medicine staff members attending this meeting included:

Dr. Donald A. B. Lindberg, Director
Mr. Kent A. Smith, Deputy Director
Dr. Harold Schoolman, Deputy Director for Research and Education
Dr. Michael Ackerman, Acting Associate Director, SIS
Mr. Harry Bennett, Deputy Director, OCCS
Mr. Fernando Burbano, Director, Information Systems
Mr. Kenneth Carney, Executive Officer, OD
Ms. Lois Ann Colaianni, Associate Director, LO
Dr. Milton Corn, Acting Associate Director, EP
Dr. George J. Cosmides, Deputy Associate Director, SIS
Dr. Roger W. Dahlen, Chief, Biomedical Information Support Branch, EP
Mr. Earl Henderson, Deputy Director, LHNCBC
Ms. Betsy Humphreys, Assistant Director for Health Services Research Information
Dr. Lawrence Kingsland III, Assistant Director for Applied Informatics
Mr. Sheldon Kotzin, Chief, Bibliographic Services Division, LO
Ms. Eve Marie Lacroix, Chief, Public Services Division, LO
Ms. Sue Levine, Chief, Office of Financial Management, OD
Dr. David Lipman, Director, National Center for Biotechnology Information
Ms. Becky Lyon, Head, National Network Office, LO
Dr. Alexa McCray, Chief, Educational Technology Branch, LHNCBC
Mr. Robert B. Mehnert, Chief, Office of Inquiries and Publications Management, OD
Dr. Elliot R. Siegel, Associate Director, Health Information Programs Development
Mr. Phillip Teigen, Deputy Chief, History of Medicine Division, LO
Mr. Richard T. West, Chief, Office of Program Planning and Evaluation, EP

Others present included:

Dr. Philip R. Lee, Assistant Secretary for Health, Department of Health and Human
  Services
Dr. Ruth L. Kirschstein, Deputy Director, National Institutes of Health
Dr. James J. Cimino, Assistant Professor of Medicine, Center for Medical Information,
  Columbia University
Dr. Lois E. DeBakey, Professor of Scientific Communications, Baylor College of Medicine,
  Consultant to the Board of Regents
Dr. Robert T. Sauer, Professor, Department of Biology, Massachusetts Institute of Technology
Mr. Peter Ballard, "The Blue Sheet"

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I.   OPENING REMARKS

Dr. H. Kenneth Walker, Chair, welcomed the Regents, consultants, and guests to the 108th meeting of the Board of Regents of the National Library of Medicine.

II.   REPORT FROM THE ASSISTANT SECRETARY FOR HEALTH

Dr. Philip R. Lee, HHS Assistant Secretary for Health, noted that NLM Director Donald Lindberg, whom he has known for some time, is "one of the real treasures of the Public Health Service." He complimented Dr. Lindberg on the work he has done as Head of the National Coordination Office for the High Performance Computing and Communications Initiative, from which the NLM Director recently announced his resignation. The development of information systems, he said, will be absolutely crucial if we are to benefit from the changes that are sweeping health care. Information is central to the transformation of the personal health care system and public health; thus the role of the National Library of Medicine is more important than ever. Dr. Lee said that he has met with directors of managed health care organizations, and there is agreement that putting prevention into practice is a key part of managed care. Critical to this is information and being able to guarantee the privacy of electronic medical records. The NLM, and its HPCC-related programs, are playing a critical role in turning research data into useful data for scientists, clinicians, and now policy makers. Public health especially can benefit from improved information and communication services, he said. Dr. Lindberg and he will be co-chairing a meeting this spring that will bring together leaders from both public health and the information superhighway. NLM is developing a white paper for this meeting that will be of great interest not only to him, but to the Vice President's staff. Betsy Humphreys is playing an important role in this area. Dr. Lee said that integrating the vocabularies of clinical medicine and health care broadly will be an important contribution to this effort. The NLM, which is deeply involved in this vocabulary effort, is thus at the heart of health reform. The Board of Regents over the next five years will play a critical role in how we develop information systems and achieve these health care objectives.

Following Dr. Lee's remarks, Dr. Michael DeBakey commented that reducing the time gap between the development of new knowledge and its clinical application remains a problem. NLM has done more than any other institution to correct this situation, but more must be done. Dr. Lee said that PHS proposes to develop performance measures with the states to be able to evaluate public health programs, for example, the outcomes of state immunization, HIV, or chronic disease programs. NLM, as the health information system's R&D arm, can assist by standardizing the vocabulary and helping to computerize medical records across these many sites and programs. Dr. DeBakey also asked about PHS plans to use telemedicine capabilities. Dr. Lee responded that the PHS was much involved in this. For example, in the Indian Health Service telemedicine is being used in remote areas, especially for radiology services. Online

remote consultation can make a huge difference to practitioners in rural areas, he said. Dr. Lee concluded by noting that the NLM is "absolutely central to where we go with the health system."

III.   REPORT FROM THE SURGEON GENERAL'S OFFICE

Dr. Kathleen McCormick, representing the Surgeon General's Office, reported that a study by the General Accounting Office has been initiated by several members of Congress that will review the Public Health Service and the Commissioned Corps. Seventeen new PHS flag officers were sworn in last week, she said. Plans continue for the bicentennial celebration of the PHS in 1998. After Dr. McCormick's presentation, Dr. Lee said that there is good progress in the search for a new Surgeon General.

IV.   REPORT FROM THE NIH DIRECTOR'S OFFICE

Dr. Ruth L. Kirschstein, NIH Deputy Director, said that the NIH was conducting a series of briefings with Institute directors in preparation for upcoming appropriations hearings. There is a new sense of energy and enthusiasm at NIH, she said. Programs are being looked at carefully as part of the federal government's "reinvention" effort. NIH, like all government agencies, is streamlining. We are looking at this as an opportunity to rethink how we have been doing business over the years and to improve our processes. There are many recent appointments made by the NIH director: the NIH Deputy Director for Intramural Research, and the directors of the Clinical Center, National Institute of Neurological Disorders and Stroke, National Institute on Drug Abuse, and Office of AIDS Research. Upcoming appointments include the directors of the Division of Research Grants, National Institute of Nursing Research, National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institute of Mental Health, National Institute of Dental Research, and the National Cancer Institute. Dr. Kirschstein said that NIH has long been concerned that its clinical researchers could not be paid the salaries they would receive outside the government. "Title 38," a provision of the federal pay system, has recognized this and been used by other agencies to rectify this disparity. NIH finally has received approval to obtain this salary structure for its clinical researchers. Dr. Kirschstein reported that Rep. John Porter, the chairman of the House Appropriations Subcommittee concerned with NIH's appropriation, visited the NIH campus last week with four of his Republican colleagues to receive briefings about the NIH. She also discussed briefly the appropriations' committee lineup on the Senate side.

In response to a question from Dr. Michael DeBakey about the future of the 42-year-old Clinical Center, Dr. Kirschstein reported that as a result of a recent report there is general agreement that a new facility is needed. There are plans to build a smaller 250-bed hospital above and connected to the present ambulatory care facility. Dr. Lee commented that funding for the new Clinical Center will be included as an add-on to the 1997 budget. Dr. DeBakey

also asked about funding levels for <u>clinical</u> research. Dr. Kirschstein replied that a group that has looked into how grant applications for clinical research fare in the peer review system has found, interestingly, that there is no difference in success rates between physician and nonphysician researchers. When applications are rewritten, however, the nonphysician applicants do better. NIH is also looking at how its research training grant mechanism is working for clinical M.D. researchers.

V. REPORT ON THE NIH DIRECTOR'S ADVISORY COMMITTEE MEETING

Dr. Walker said that three topics were discussed at the NIH Director's Advisory Committee meeting several weeks ago: extramural research and intramural research (reported to the NLM Board by Dr. Kirschstein and Dr. Milton Corn) and, most prominently, fetal tissue research.

VI. CONSIDERATION OF MINUTES OF PREVIOUS MEETING

The Regents approved without change the minutes of the September 27-28, 1994, meeting.

VII. FUTURE MEETING DATES

The Board will meet next on May 23-24. Next fall's meeting will be September 26-27. The proposed dates of January 23-24, 1996, were accepted and confirmed for next winter's meeting.

VIII. REPORT FROM THE NLM DIRECTOR

Dr. Lindberg showed tables containing FY 1995 budget figures. The President's request was for $138,521,000; the actual appropriation provides an operating budget of $128,523,000. This provides for inflationary increases necessary to maintain basic library functions and includes increases for NLM High Performance Computing and Communications programs and AIDS-related information activities. Recisssions are in the air, Dr. Lindberg said, but NIH seems to have escaped the worst for 1995. There is considerable trepidation, however, about the 1996 budget (which is not yet available). As to staffing, the NLM Director reported that the Federal Government is committed to reducing 250,000 positions, which translates to roughly 15 percent at NIH. NLM's full-time equivalent allotment has been reduced to 586 for FY 1995. NIH overall is 900 positions under what is permitted--a precarious position. Dr. Lindberg described the "voluntary separation incentives program" under which the government encourages employees to retire by offering a bonus. A number of long-time NLM employees have accepted the offer, including Kenneth Carney (Executive Officer), Harry Bennett (deputy head of the Office of Computer and Communications Systems), Peri Schuyler (head of the Medical Subject

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Headings Section), and Dr. George Cosmides (Deputy Director of the Division of Specialized Information Services). Dr. Lindberg also welcomed the new Library Associates and two new GenBank fellows working with the National Center for Biotechnology Information--Dr. Leipe (from Germany) and Dr. Makalowski (from Poland). Dr. Donald Detmer, a former member (and chairman) of the Board of Regents, and Vice President for Health Affairs at the University of Virginia, is coming to NLM on a sabbatical. The NLM Director noted, as Dr. Lee also mentioned in his remarks, that he has announced his resignation as Director of the High Performance Computing and Communications Initiative. He will serve until a replacement is named. The Library has benefited much from its association with the HPCC.

Dr. Lindberg also reported on a meeting of more than 150 medical journalists at the Library on the evening of November 17. The program, which included briefings on the Visible Human, biotechnology, toxicology and environmental health information services, and Grateful Med/MEDLINE, was organized by Bob Mehnert of the NLM Public Information Office. Many of the journalists were members of the local chapter of the American Medical Writers Association and the D.C. Science Writers Association. Another meeting the Director reported on was on vocabularies for computer-based patient records organized by NLM's Betsy Humphreys with the Agency for Health Care Policy and Research. Our investment in the Unified Medical Language System is coming to fruition--the Metathesaurus and other developments by experts under the UMLS are going to have a significant impact on the development of electronic patient record systems. Finally, Dr. Lindberg reported on a first meeting to review NLM's TOXNET (toxicology and environmental health databases) by the Institute of Medicine. The IOM has confirmed that NLM's services in this area are of high quality, much needed, and too little utilized. The IOM has proposed that it function as a coordinating committee to convene six to eight users panels or focus groups to review the various aspects of NLM's TOXNET databases and make recommendations to the Library. Board Chairman, Dr. Walker, has reviewed the TOXNET databases and has met with IOM officials.

Following Dr. Lindberg's presentation, the Board of Regents unanimously voted their appreciation for those retiring from the Library who have contributed so much to the institution's success over the years.

IX.   REPORT FROM THE BOARD OF SCIENTIFIC COUNSELORS, NCBI

Dr. Robert T. Sauer, Chairman of the NCBI Board of Scientific Counselors, said that the Center has a dual role: service activities (for example, providing access to GenBank) and basic research. He said that the NCBI has undergone a marvelous evolution since its beginning just five years ago. The Board believes that the leadership of NCBI is "spectacular." GenBank continues to grow exponentially, as does its use by the scientific community. A wonderful set of software tools (such as Entrez and BLAST) has been developed to help scientists deal with

sequence issues. New tools under development by NCBI, such as "SEQUIN," hold great promise. The Board of Scientific Counselors has identified a number of challenges and issues the Center will be facing. One is the continuing creation and maintenance of the nucleic acid database as an international collaborative effort which, although successful so far, is by its nature tenuous. The long-term status of the Genome Sequence Data Base (GSDB) in Santa Fe is also a continuing question. There are problems associated with success, for example, the growth of the GenBank database and the desire of scientists for broader access to related information (such as MEDLINE records). The continuing production of GenBank and Entrez on CD-ROM is also problematic because of the number of disks involved as they grow. It may be necessary to curtail CD-ROM versions in the future and make network access the primary route of access. The growth in network access (now running at about 20,000 queries a day) presents its own set of problems, including the capability of current computer hardware and the growing need to provide help to users. Dr. Sauer warned that the number of people majoring in biology is increasing rapidly (it doubled at his school in the last two years) and the potential exists for many of those computer literate undergraduates to be searching the NCBI databases. It won't be long before high school students are searching the databases. He said, one could easily see the number of individuals using GenBank increase from 25,000 to 100,000 and even a million in the not-too-distant future. Dr. Lipman and his staff are now planning meetings with representatives of the academic community to decide how to deal with this prospect.

Following Dr. Sauer's presentation, Dr. Carol Newton asked whether NCBI was working with professional societies to provide tutorials at their meetings. Dr. Sauer replied that this is already happening; it is the growing audience of users who do not attend the national meetings that will be a problem. Replying to Dr. Cortez, who asked about the possibility of networking the CD-ROMs, Dr. Lipman, NCBI Director, said the Center will look very carefully before making any decisions on the CD-ROMs. He noted that CD-ROM Entrez is the second most widely distributed CD from the Government Printing Office. Any decision will wait for the results of a survey of all those currently receiving the CDs that is now under way. Preliminary results show that more than two thirds are ready to move to some other form of access. Dr. Lipman said that a number of companies that provide information services and software are providing "hooks" in their software that tap into the NLM system. This may tend to hold down the amount of user support necessary from NCBI, since user queries will go to the commercial provider. Dr. Newton asked how errors will be detected in the increasing amount of information coming into the database. Dr. Lipman said they have developed "validation tools" (including one for the World Wide Web) that are being put into the software scientists use when they submit data to GenBank. One difficulty is that before changing any submitted data, confirmation must be received from the originator. Dr. Lipman thanked Dr. Sauer, whose term on the Board of Scientific Counselors is expiring in June, for his excellent leadership of the Board.

X.   NLM OUTREACH REPORT TO CONGRESS

Ms. Karen Wallingford of NLM's Office of Health Information Programs Development presented a "Status Report on Outreach Funding and Activities," prepared at the request of the Senate Appropriations Committee. As background, she briefly recounted for the Board the history of the NLM Outreach Program. Its broad outlines were set out in 1989 in the report of a Long-Range Planning Panel headed by Dr. Michael DeBakey. Its recommendations were in four areas: improve the NLM-Regional Medical Library partnership, strengthen local institutions' access to information through grant programs, increase NLM medical informatics training and career development awards, and accelerate R & D on information products for health professionals. Ms. Wallingford briefly described some of the highlights of the report to the Congress (which had been sent to the Regents earlier), describing how NLM has responded to the Panel's recommendations. Examples of these responses included reconfiguring the network into the present National Network of Libraries of Medicine, vigorous promotion of Grateful Med use in the medical community, a new grant program for connecting local institutions to the Internet, and the development of new products and services such as Loansome Doc, clinical alerts online, and the full-text HSTAT database. There have also been special programs to improve access to HIV-AIDS electronic information sources. Dr. Elliot Siegel, NLM Associate Director for Health Information Programs Development, chairs the Library's outreach coordinating committee. A comprehensive outreach report, similar to that prepared for the Senate (but with evaluation and recommendations for the future), is now being assembled by a working group of the outreach committee.

Following Ms. Wallingford's presentation, NLM consultant Dr. Lois DeBakey said that what has been accomplished in the last five years is impressive. Circuit rider librarians in the regions, who demonstrate NLM services and train people to use them, have been a success. An impressive array of instances of health professionals using Grateful Med and the databases to save lives has been cited in the Library's publication, Gratefully Yours. Nevertheless, there remains much to be done in outreach. Many physicians still do not use NLM's databases. Providing NLM information to the general public, frequently through public libraries, is a positive trend, Dr. DeBakey said. She appealed to the Board members to promote NLM products and services within their institutions. Dr. Michael DeBakey said that it is gratifying to find a government agency that responds so effectively to recommendations from advisory committees. "It is a model of how government should work," he said. The idea of linking every doctor to MEDLINE via computers and the information superhighway is no longer visionary--it is practical and necessary, he said. Dr. Lindberg commented that using the medical schools is probably the most high-leverage strategy for increasing the use of MEDLINE and Grateful Med. Dr. Walker concluded the discussion by saying that when people look back at the Library 100 years from now, the outreach program will be seen as one of the most important factors in shaping the NLM. The outreach program is a seminal idea, it captures people's imagination, and it is eminently doable and practical. It is useful to contrast the outreach activity with the NCBI program, where we have a group of users who are "desperate" for the information. It

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turns out that it is more difficult to inform and persuade people that they need to access online information services to provide quality health services than it is to respond to exponentially growing demand by a group of informed users.

XI. NPR-NLM STREAMLINING AND REINVENTION LAB

Mr. Kent Smith, NLM Deputy Director, using slides, presented to the Board how NLM is responding to the Federal Government's streamlining initiatives generated by the National Performance Review (NPR). NLM's approach is to develop a formal streamlining plan (as are other NIH components) and to participate in the NPR initiative as a "reinvention laboratory." Mr. Smith said that NIH between 1994 and 1999 must reduce its workforce by about 15 percent (2500 positions). These reductions are targeted at certain kinds of positions. NLM's part of this reduction, perhaps just the first wave of such cuts to come, is to lose 93 positions. Mr. Smith presented a chart with historical data of NLM's staffing levels. Some programs and activities will surely have to be curtailed or eliminated to live with the lower staffing levels, he said. NLM now contracts for the equivalent of 250 positions each year; but further contracting may well result in lower quality of service. NLM has been assigned several new initiatives over the past few years (health services research information, electronic patient records, imaging, telemedicine, HPCC, etc.), and there is no reason to believe that more new responsibilities will not be assigned in the future. Dr. Lindberg has appointed a temporary working group to plan how NLM can streamline its activities and meet its lower staffing allocations. The first draft of such a plan is due in April. The second part of NLM's approach to NPR is to become a "reinvention lab"--an experimental site for new ways of doing business that empowers employees, reengineers work processes, and cuts certain administrative red tape (in contracting and procurement, for example). NLM applied to be a reinvention lab and was granted this status by the Department last August. In its justification, NLM articulated a plan to "reinvent" its information systems--to convert them from the outmoded internally developed mainframe systems that, although adequate for traditional databases, are not optimal for linking the new generation of information services to a wider universe of more varied users. The benefits of such a changeover would be several, including reduced reliance on expensive mainframe systems, and provision of new services in a less costly manner to more users. Central to the planning process, System Reinvention at NLM is the concept of increasing availability of Internet access both for information delivery and to facilitate user surveys and feedback which help NLM refine its offerings and services. Mr. Smith described how this reinvention effort has been organized in four working groups under his direction. The "access model," to be demonstrated to the Board by Dr. Lawrence Kingsland later at this meeting, is one part of this overall effort. Other parts of the project are the retrieval system, file generation and maintenance, and the Integrated Library System.

Following Mr. Smith's presentation, Dr. Lois DeBakey, consultant to the NLM, applauded the goals of increasing efficiency and cutting costs. It will be especially challenging for the NLM

to reduce its staff and maintain services. Eliminating certain administrative red tape, as outlined by Mr. Smith, will help. If we dismantle governmental agencies that are no longer needed, and if we restructure those that are inordinately costly or inefficient, we might not have to jeopardize organizations like the NLM that function efficiently and serve a valuable public need. The crucial questions are what is NLM's mission? Is it still the right mission? Is it still worth doing? Some agencies become obsolete. It would be folly to sacrifice good performance in one sphere just to retain an obsolete activity in another. Mr. Smith said that Dr. DeBakey's observation was a valuable one--that NLM should take a careful look at what it is doing, not just how it is doing it. Dr. Michael DeBakey expressed his concern that these activities might have an adverse effect on the functioning of the Library. His own experience with NLM is that "it is probably the most efficient and the most productive element of government that I know." He would not want that to be compromised through streamlining and downsizing. The Board of Regents has a responsibility to monitor the Library and should keep a careful eye on these activities. Dr. Walker asked whether it might not be possible for the NLM to spin off or farm out some of the fruits of its innovation, while maintaining control of the quality of the resulting products. Dr. Lindberg agreed with this model, saying that the Unified Medical Language System was a highly successful example of this strategy.

XII. NLM ACCESS MODEL AND DEMONSTRATION OF PROTOTYPE SYSTEM

Dr. Lawrence Kingsland, Chief of the Lister Hill Center's Computer Science Branch, said that the objective of the Access Model is to provide users with intelligent, interactive retrieval from disparate information resources as NLM's databases and systems evolve. The key to the process is to build a flexible but well defined gateway environment that is designed to cope with changing system resources. The designers have made several assumptions about users: They may know which NLM database contains the information they seek; they may not know which terms to use in searching; they may not know how to improve a suboptimal search; and the *appearance* of interactive searching is important to many users (whether or not a connection is actually maintained). Dr. Kingsland showed several visuals that outlined the Access Model schematically--from the intelligent central gateway to the multiple "backend" systems (ELHILL, TOXNET, full-text databases, image databases, etc.). The architecture for the Access Model is a "perfect fit" for the World Wide Web paradigm--it contains a client, a request manager, a library of intelligent search aids, the Metathesaurus and other knowledge sources, and a series of database interfaces tied together by an access protocol. Dr. Kingsland then described briefly each component of the Access Model. Current functions of the access prototype (for the time being called NetCoach) help users create, submit, and refine a search in MEDLINE (other databases will be added to its repertoire). It can search by subject keyword, text word, title word, and author name, and it can limit a search by language, publication type, study group, age group, and year (back to 1966). NetCoach offers direct links to the full text of clinical practice guidelines and the Online Images of the History of Medicine file. Dr. Kingsland discussed how the various search functions are invoked--some automatically. All the diversity and links

inherent in the Metathesaurus are available to the NetCoach user. The system will go into alpha test this month and beta test this summer. He discussed some of the features--neighboring, Loansome Doc, and others--that will be added to the Access Model in the future. Following his presentation, Dr. Kingsland conducted several searches demonstrating the prototype Access Model using a Sun workstation and the Mosaic software.

Following the presentation and demonstration, Dr. Carol Newton said that the system speaks for itself--that it provides "incredible access to information" and makes excellent use of the World Wide Web. She noted with satisfaction that developments in different parts of the NLM were being integrated to make a whole that is greater than the sum of its parts. She asked whether there were plans to extend the reach of the Access Model to databases outside the NLM. Dr. Kingsland replied that as systems get added to the Information Resources Map, access to them will be facilitated. In response to another questions, he said that the alpha testing will include clinicians as well as other typical users of NLM's online network. Wendy Carter commented that NLM has made great strides in overcoming the behavioral impediments to using databases--to narrow or broaden the scope of a search without having to type at the terminal. Also, she said that the "invisible" linking of the different knowledge sources and databases will be a great boon to the user.

XIII. REPORT ON INTERNATIONAL PROGRAMS

Dr. Elliot Siegel, NLM Associate Director for Health Information Programs Development, gave an overview of the Library's longstanding international programs. As early as 1879, the Library placed great importance on the world's scholarly biomedical literature. Coverage of the overseas literature still represents almost 50 percent of the content of the *Index Medicus* and MEDLINE. From the very earliest days of the computerized database, in the mid sixties, foreign health professionals were an important part of the user base. A quid pro quo strategy was developed whereby, in return for access to the database, the foreign MEDLARS Center would provide reciprocal services--in selecting, indexing, and sharing the literature. Thus, both U.S. and foreign health professionals would have access to the best of the world's biomedical literature. Such quid pro quo arrangements were sealed with formal, bilateral agreements that are still in force today. These agreements have also been the basis for occasional special experimental arrangements. Early foreign centers (such as Sweden and the United Kingdom) received computer tapes from NLM as the basis of their MEDLINE offering; some later centers provided access through direct online hookup to NLM; some offered both modes of access. Institutions designated as foreign centers are selected by the host government. At the present, there are partnership arrangements with 20 countries (including the Pan American Health Organization). However, Dr. Siegel explained, MEDLINE access is far more widespread than these 20 agreements would imply. This is because the NLM also leases MEDLINE to commercial online services and CD-ROM vendors, who have extensively marketed their products in other countries. We are seeing a decided shift to the newest route of international

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MEDLINE access, the Internet. In fact, NLM now promotes the Internet as the exclusive route of access for all new centers--the first being Israel in 1993. Our goal in promoting such access is to make MEDLINE available not only in schools, libraries, and laboratories but, ultimately, in homes and offices. Dr. Siegel said that institutional cooperation between the U.S., Russia, and the Newly Independent States of the former Soviet Union is on the rise, although there is not yet a formal MEDLARS Center there. NLM has been instrumental in introducing BITNIS as an Internet gateway for institutions in several of those states. BITNIS was developed several years ago by NLM and PAHO as a way to connect health professionals in South and Central America with NLM databases. The next step will be to support full Internet access in the former Soviet Union states, he said. One problem is the often-steep tariffs imposed by local postal and telecommunications agencies. NLM is working with international organizations to ameliorate this problem. Dr. Siegel said that a concerted long-range planning effort by NLM was needed in the area of international access. Such an effort will be initiated later this year on behalf of the Board of Regents. Among the key issues that must be considered: How should NLM position itself to serve individual health professionals on the Internet in countries where there is no MEDLARS Center? Is it time to "reinvent" the concept of the foreign MEDLARS Center? What is the appropriate overseas analog of the fixed-fee arrangements that are becoming increasingly popular in the U.S.? How can libraries, publishers, and telecommunications providers collaborate to explore new models of document delivery that make use of the Internet? Such questions portend important changes in the future operation of NLM's international programs.

Following Dr. Siegel's presentation, Ms. Beverly Allen commented that the Atlanta-Tblisi partnership (which Dr. Siegel had mentioned) is a many-pronged program sponsored by the Morehouse College of Medicine and Emory University. She noted some of the problems in the Republic of Georgia that must be overcome, for example poor telephone service and expensive (and uncertain) e-mail. Medical library resources are abysmal. Dr. Walker, who was in the Republic of Georgia in December 1994, said that it was essential that they become hooked up to the Internet. He said it costs about $7000 a month for such access as exists. Dr. Mary Clutter commented that the scientific community in Europe is encouraged to subscribe to Euronet, the varying protocols for which are "a mess." NLM should be making plans to improve its programs to collect information from other countries, not just its programs to disseminate information.

XIV. THE VISIBLE HUMAN PROJECT

Dr. Michael Ackerman reported to the Board on the current status of the Visible Human project. The Board has received progress reports several times in the past. In November 1994, the Visible Man was announced to the public and demonstrated in Chicago at the annual meeting of the Radiological Society of North America. It received much attention in the press-- radio, network television, weekly news magazines, and daily newspapers. Dr. Ackerman played

television clips from CBS national news and from a CNN science/technology program. Newspaper clippings of varying length were on display in a scrapbook prepared by the Public Information Office. Dr. Ackerman recounted the five-year history of the Visible Human, a project to create a three-dimensional, computer-generated, incredibly detailed atlas of human anatomy. It was created from thousands of images of a male cadaver, images collected with state of the art radiographic and photographic techniques. The entire dataset requires 15 gigabytes of computer storage. He described the planning process (which involved the Board of Regents), how a contractor--the University of Colorado Health Sciences Center--was selected, and how a suitable cadaver was located, evaluated, and subjected to the various imaging processes. Dr. Ackerman showed several videotapes produced by the University of Colorado about how the cadaver was prepared, the photography done, and the resulting images. Sample images from the Visible Man are available on NLM's ftp server, on Mosaic, and on the NLM Gopher. If they wish the database, the users can download a license agreement, sign it, and send it back to NLM (with some indication of their intended usage). There is no charge. The response, Dr. Ackerman said, has been overwhelming. Since December 1, he has received 900 inquiries via the Internet; more than 100 license agreements have been signed. Examples of proposed projects: digital atlases, imaging research, musculoskeletal modeling, surgical simulation, multimodal imaging, joint kinematics, modeling bone sets, teaching, electromagnetic and radiation exposure models, a holographic atlas, virtual reality renderings, trauma injury modeling, graphic art, and educational games. The dataset is available from the National Technical Information Service on six tapes (head, thorax, abdomen, pelvis, thigh, and feet--purchasable separately or as a set). One company successfully downloaded the entire database over the Internet in nine days, around the clock. The Visible Woman, now being prepared by the University of Colorado scientists, is due out next fall. The next step is to convert the existing image dataset to a national database--labeling and delimiting the areas that contain identified body parts.

Following Dr. Ackerman's presentation, Dr. Michael DeBakey commented that the Visible Human project is the most important advance in this field since Vesalius. It is an extraordinary example of the changing function of the NLM, that is, converting the Library from a repository to an innovator and dispenser of knowledge. Any streamlining or shrinking of activities that would jeopardize such a project must be resisted. Dr. Clutter said that this was the first NLM project she became involved with when she became a member of the Board of Regents and it has turned out to be a "stunning achievement." Dr. Lindberg said that the project had its origins in the Board's Long Range Plan, and it is but one example of the great value of the Board's wisdom in guiding the Library.

XV. REPORT FROM EXTRAMURAL PROGRAMS

Dr. Milton Corn, Acting Associate Director for Extramural Programs, reported briefly on EP's budget and funding plans for FY 1995. He noted that there would be funds available for

approximately 70 new grants. He then discussed the newly initiated Cooperative Agreement Grant Program ("Electronic Medical Record Systems") which provides funding for research and development of computerized patient records. While the funds available are limited, it is a start. The program is a joint endeavor of the NLM and the Agency for Health Care Policy and Research. To date, eight awards have been made. A number of institutions have expressed an interest in participating, while using their own funds. Discussions have been held with the Veterans Administration and the Department of Defense regarding the possibility of their participation in testbedding.

Dr. Corn presented a new NLM program for the Board's concept review, called "Planning Grants for Health Sciences Librarians' Training." He noted that the NLM Planning Panel on Education and Training of Health Sciences Librarians had identified four priority areas to be considered by the Library: 1) the evolving roles for health sciences librarians, 2) professional education programs, 3) lifelong learning programs, and 4) broadening recruitment into health sciences librarianship. The grant would be of a one-year duration. NLM plans to announce a request for applications (RFA) for support of planning in one or more of the four areas targeted by the Panel. The planning grant will be for one year; co-funding would be helpful, but not required; and consortia of eligible institutions will be encouraged to apply. The Board approved the program concept.

As required annually, Dr. Corn presented for review the Board Operating Procedures, "Guidelines for Adjustments by Staff in Time or Amount of Grant Award." The Guidelines were reaffirmed unanimously.

MEETING CLOSED FOR THE REVIEW OF GRANT APPLICATIONS
January 24, 1995, 4:30 to 4:45 P.M.

XV.   REVIEW OF PENDING APPLICATIONS

The Board reviewed 61 applications, requesting $29,808,250 and recommended for further consideration 49 applications in the amount of $24,844,822 for the total requested. Twelve applications in the amount of $4,963,428 were not recommended for further consideration. Grant applications recommended for further consideration by the Board are listed in the summary action.

MEETING OPEN--JANURY 26, 1995, 9:00 A.M. TO ADJOURNMENT

XVI. REPORT FROM LHC BOARD OF SCIENTIFIC COUNSELORS

Dr. James J. Cimino, Chair of the Lister Hill Center Board of Scientific Counselors, reported on the results of several recent meetings of that advisory group at which four major LHC projects were reviewed. The goal of the first project, the **DocView** project led by Dr. George Thoma, is to provide online access to full text in the form of bit-mapped images. The system includes a Windows-based client viewer and an image server. The Board was presented with a plan for further development and evaluation. The Counselors were enthusiastic about DocView--the prototype, the evaluation plan, work with collaborators, and plans for future development. The Board did make suggestions about the performance evaluation of the hardware and software. The second program reviewed was the **full-text retrieval project** led by Charles Goldstein. This is a project for retrieving ascii full text (as opposed to bit-mapped images). It includes cross-platform windowing interfaces, development of a full-text retrieval system, and providing access to the full-text HSTAT database. The Board was impressed with the long-term success of the online Mendelian Inheritance in Man project (in which the LHC staff was earlier involved), which is much used in the scientific community, and the advisors are enthusiastic about the present full-text retrieval project. They had several suggestions for the project: LHC should encourage the publishers to produce the text in one standard format; there should be increased participation by the information retrieval community; the user base should be enlarged (for example, the IAIMS sites would be ideal for exploring the use of full-text retrieval); the focus should be on both document and paragraph-based retrieval; and there should be more peer-reviewed publications and presentations coming out of the project. The third program reviewed was the evaluation of the **MedIndEx project**, led by Susanne Humphrey. This is an expert system for assisting MEDLINE indexers. The Counselors were "effusive" in their praise for MedIndEx and are excited about its potential for practical application at the Library. MedIndEx is generalizable to other medical and nonmedical databases, Dr. Cimino said. The evaluation plan presented to the Counselors was very well designed, although they did recommend more joint efforts with NLM's Library Operations for both evaluation and future implementation. The fourth was the **Natural Language Systems project** (NLS), led by Dr. Alexa McCray. This project looks at techniques for interpreting user queries to online information sources. It involves lexicon development, development of analytical methods for morphologic, syntactic, and semantic parsing of queries, and methods for concept representation. The Board of Scientific Counselors was impressed with the breadth and depth of the deliverables and the excellent publication record of the LHC scientists. The Counselors said that much work remains to be done both short- and long-term in expanding the pieces of the project. Outside collaboration needs to be expanded for evaluation purposes, and the Board was interested in seeing how the NLS and the MedIndEx project could fit together. Similarly, the expanding NLS lexicon should be coordinated with the NLM Unified Medical Language System (UMLS) project, especially the Metathesaurus.

XVII. NATURAL LANGUAGE PROGRAM

Dr. Alexa McCray, Chief of the LHC Cognitive Science Branch, noted that Dr. Cimino, who preceded her, gave a good overview of the Natural Language Systems Program. The long-term project plan is to address the problem of providing improved access to information, especially the contribution that natural language processing techniques can make. A prototype system called SPECIALIST, which has both linguistic and domain (biomedical) knowledge has been under development. Domain knowledge is from the UMLS and its set of knowledge sources--primarily the Metathesaurus and Semantic Network. Dr. McCray demonstrated the Natural Language System's major components: the lexicon (dictionary), morphology (analysis of work pieces), syntax (constituent structure of phrases), semantics (the meaning at sentence level), and pragmatics (world and domain knowledge). She described briefly the present status of and work being done on each component. Using the phrase "inferior vena caval stent filter," she demonstrated on a terminal how a typical query would be analyzed by the system, attempting to map it to the Metathesaurus so that the closest fit can be found from the Medical Subject Headings vocabulary. There are 14 beta test sites for the knowledge source server developed by the group and the LHC plans to release the server to the UMLS community this spring.

Dr. Clutter termed Dr. McCray's presentation a "tour de force," and said that the Natural Language Systems Program was a view of the future. She commented that it may be applicable to other biological databases and asked whether there were other, related projects by other agencies. Maria Pisa of the National Agricultural Library said that the NAL was also involved in vocabulary work in collaboration with other agencies such as the UN's Food and Agricultural Organization. In response to a question from Dr. Cortez, Dr. McCray said that much of the linguistic work being done at NLM is domain-independent and could be used in other areas (in fact, there are other groups using NLM's lexicon). Dr. Michael DeBakey asked how staff kept up with the new terms constantly being invented by the medical profession. Dr. McCray answered that the UMLS, which is updated annually, will be the primary vocabulary source for the NLS.

XVIII. COLLECTION MANAGEMENT SYSTEM

Ms. Martha Fishel, Deputy Chief of the Public Services Division, described and demonstrated the Library's new Collection Management System (CMS), operational since June 1994. The CMS was developed by NLM's Office of Computer and Communications Systems staff and contractors as a function of the Library's "Locator" public access catalog. Locator provides patrons and staff with access to CATLINE, SERLINE, AVLINE, and DIRLINE databases. Although Locator is available to outside users via the Internet, the new Collection Management System is available only to on-site users. CMS allows patrons to use convenient terminals to request materials from NLM's closed-stack collection. Ms. Fishel described the old manual system, which involved the filling out a four-part "Reader Request" form (including the necessity

for looking up the call number of a journal on a huge paper printout) and leaving the form at the Circulation Desk. The process worked, but it was onerous and greatly liable to mistakes. The new CMS works well and has been embraced by staff and patrons alike. It includes the following features: online registration for patrons; patron name and journal information is transferred automatically to the computerized "form"; the system tells the patron whether or not a requested monograph is available; patrons can check the current status of their own requests; bar-coded data is reliably read by the system; requests are routed automatically to the appropriate part of the stacks on the lower three floors; the system automatically counts patron requests so that certain limits aren't exceeded; statistical reports are generated daily, weekly, and monthly by the system on e-mail; and problems of handwriting illegibility have been eliminated. Assisted by Mary Conway, Ms. Fishel demonstrated the system to the Board, showing how the system is used in turn by patrons, staff at the Circulation Desk, and staff in the collection who retrieve the requested items from the stacks.

Following Ms. Fishel's presentation, Dr. Richard Rowberg commented that the system functions well and relieves both patrons and staff of many of the burdens of literature retrieval from the stacks. Its data collecting capability will be a great boon to the Library in evaluating and fine-tuning its services. In response to a question from Dr. Clutter, Ms. Fishel said that NLM would like eventually to link the new system to DOCLINE and allow outside users the same sort of access to the monograph collection. Dr. Cortez asked whether patrons can reserve an item if the system shows it is unavailable. Ms. Fishel said that NLM has never instituted this practice, primarily because interlibrary loan has priority over on-site patrons.

XIX. INFORMATION RETRIEVAL--IMPROVEMENTS FOR ONLINE USERS

Mr. David Kenton of the Office of Computer and Communications Systems staff reported on two new improvements to the Library's online information system: an upgraded ELHILL retrieval system (ELHILL 3.4) and an online user registration system. Mr. Kenton said the network continues to grow rapidly, adding some 2,000-3,000 users each month. The present count stands at about 125,000 user codes. ELHILL has been the MEDLARS software system for more than 20 years. Major changes are made every three to four years. Even though the system reinvention initiative (presented to the Board yesterday) will eventually result in an all-new information retrieval system, ELHILL will remain in place for several years and certain new features are desired by our users. Mr. Kenton demonstrated two of the new features of ELHILL 3.4 to the Board: proximity searching and nested searching. Proximity searching now allows users (without any change to the database itself) to use the operators "adjacent" (next to, left or right), "near" (in the same sentence), and "contains" (a subset of citations may be searched for words or a proximity expression). Mr. Kenton connected to a test version of MEDLARS and demonstrated these new capabilities. He next showed the screen for the new NLM Network Applications Gateway, the first thing command-language users will see when connecting to MEDLARS. One of its capabilities will be to allow users to register in an online

mode, without the necessity of mailing an application to NLM. The system will also allow them to order Grateful Med electronically. Mr. Kenton showed how this could quickly and easily be done.

Following Mr. Kenton's presentation, Dr. Cortez commented that the improvements demonstrated are important and represent the state of the art. Proximity or adjacency operations greatly improve retrieval when used as adjuncts to traditional Boolean operators (and, or).

XX. APPOINTMENT OF NOMINATING COMMITTEE

The Chairman appointed a committee to nominate a candidate to chair the Board of Regents in 1995-1996: Dr. James Zimble (chairman), Wendy Carter, and Capt. David Kemp.

XXI. DEMONSTRATION OF IMAGES FROM THE HISTORY OF MEDICINE

Dr. Philip Teigen, Acting Chief of the History of Medicine Division, said that the development of the Images from the History of Medicine (IHM) project goes back 10 years, when a pilot videodisk with about 1000 pictures (and printed descriptive records of the pictures) was produced. It was well received, and the decision was made to produce a much larger collection on disk, with accompanying automated descriptive records. A project was begun, jointly staffed and funded by Library Operations and Lister Hill Center staff, to put some 60,000 historical images on disk, linked to online records. In November 1993, beta testing of the resulting disk was begun at 11 sites around the country. The testing showed that the videodisk technology was expensive and time-consuming to set up and would be an impediment to the distribution of the images. We also learned that more information needed to be provided in the descriptive records. In the spring of 1994, Dr. Richard Rodgers of the Lister Hill Center prepared a Mosaic version of IHM and made it available on the World Wide Web in June. The collection of images was thus made available around the world to a very large pool of potential users, and the problems of videodisk production and distribution were bypassed. Several things remain to be done, Dr. Teigen said: More pictures should be added to the service; the descriptive records should be improved; image quality should be improved so pictures can be downloaded without an intermediary; and the search software should be made more sophisticated to improve searching capabilities. Following Dr. Teigen's introduction, Dr. Rodgers demonstrated the Images from the History of Medicine database via the Library's World Wide Web server (HyperDoc, the address for which is http://www.nlm.nih.gov/) .

XXII. ADJOURNMENT

The meeting was adjourned at 12:00 noon, Wednesday, January 25.

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Subcommittee Meeting on Monday, January 23:
Extramural Programs Subcommittee--2:00-3:30 p.m.
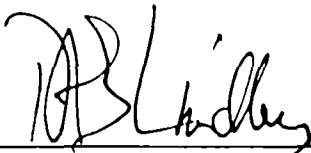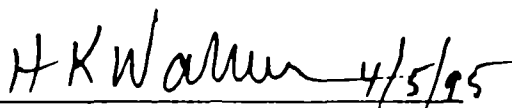(Attachment B)

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ACTIONS TAKEN BY THE BOARD OF REGENTS

1.   The Chairman appointed a committee to nominate a candidate to chair the Board of Regents in 1995-1996.

2.   The Board concurred with the recommendations of the Extramual Programs Subcommittee.

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I hereby certify that, to the best of my knowledge, the foregoing minutes and attachments are accurate and complete.

Donald A.B. Lindberg, M.D.   (Date)
Executive Secretary

H. Kenneth Walker   (Date)
Chair

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