

**DEPARTMENT OF HEALTH AND HUMAN SERVICES  
NATIONAL INSTITUTES OF HEALTH  
NATIONAL LIBRARY OF MEDICINE**

**MINUTES OF THE BOARD OF REGENTS  
May 8-9, 2007**

The 145th meeting of the Board of Regents was convened on May 8-9, 2007, at 9:00 a.m. in the Board Room, Building 38, National Library of Medicine (NLM), National Institutes of Health (NIH), in Bethesda, Maryland. The meeting was open to the public from 9:00 a.m. to 3:50 p.m., followed by a closed session for consideration of grant applications until 4:15 p.m. On May 9, the meeting was reopened to the public from 9:00 a.m. until adjournment at 12:00 p.m.

**MEMBERS PRESENT [Appendix A]:**

Dr. Holly Buchanan [Chair], University of New Mexico  
Mr. Richard Chabran, California Community Technology Policy Group  
Dr. Jordan Cohen, Association of American Medical Colleges  
Dr. C. Martin Harris, The Cleveland Clinic Foundation  
Dr. O. Wayne Isom, New York Presbyterian-Weill, Cornell Medical School  
Dr. Vasiliki Karlis, New York University, College of Dentistry  
Dr. Cynthia Morton, Brigham and Women's Hospital  
Ms. Eileen Stanley, Former Director of Library Services, Allina Health Care

**EX OFFICIO AND ALTERNATE MEMBERS PRESENT:**

Dr. Haym Hirsh, National Science Foundation  
Major General Thomas Loftus, U.S. Department of the Air Force  
Dr. Deanna Marcum, Library of Congress  
Dr. Patrick Malone, U.S. Department of the Navy  
Rear Admiral Kenneth Moritsugu, Office of the Surgeon General, PHS  
Col. John Powers, U.S. Department of the Army  
Dr. Charles Rice, Uniformed Services University of the Health Sciences  
Ms. Mary Ann Tatman, U.S. Department of Veterans Affairs

**CONSULTANTS TO THE BOR PRESENT:**

Dr. Tenley Albright, Massachusetts Institute of Technology  
Dr. Marion Ball, Johns Hopkins School of Nursing/IBM Research  
Dr. Thomas Detre, University of Pittsburgh  
Dr. William Stead, Vanderbilt University  
Dr. H. Kenneth Walker, Emory University School of Medicine

**SPEAKERS AND INVITED GUESTS PRESENT:**

Dr. Syed Ahmed, Medical College of Wisconsin, Milwaukee  
Dr. Paul Biondich, Regenstrief Institute, Inc.  
Dr. Henry Lewis, Florida A&M University  
Mr. Melvin Spann, Retired, NLM  
Dr. John Gallin, Clinical Center, NIH

**MEMBERS OF THE PUBLIC PRESENT:**

Mary Lindberg  
Mr. Thomas West, The Krasnow Institute

**FEDERAL EMPLOYEES PRESENT:**

Dr. Donald A.B. Lindberg, Director, NLM  
Ms. Betsy Humphreys, Deputy Director, NLM  
Dr. Donald King, Deputy Director for Research and Education, NLM  
Dr. Michael Ackerman, High Performance Computing & Communication, NLM  
Ms. Stacey Arnesen, Division of Specialized Information Services, NLM  
Ms. Suzanne Aubuchon, Office of the Director, NLM  
Ms. Joyce Backus, Division of Library Operations, NLM  
Dr. Steven Bryant, National Center for Biotechnology Information, NLM  
Ms. Kathy Cravedi, Office of Communications & Public Liaison, NLM  
Dr. Milton Corn, Division of Extramural Programs, NLM  
Mr. Todd Danielson, Executive Office, NLM  
Ms. Gale Dutcher, Division of Specialized Information Services, NLM  
Dr. Valerie Florance, Division of Extramural Programs, NLM  
Ms. Cynthia Gaines, Division of Specialized Information Services, NLM  
Mr. David Gillikin, Division of Library Operations, NLM  
Dr. Zoe Huang, Division of Extramural Programs, NLM  
Ms. Christine Ireland, Division of Extramural Programs, NLM  
Mr. Avi Kimchi, National Center for Biotechnology Information, NLM  
Mr. Sheldon Kotzin, Division of Library Operations, NLM  
Dr. David Lipman, National Center for Biotechnology Information, NLM  
Dr. Simon Liu, Office of Computer and Communication Systems, NLM  
Dr. Robert Logan, Lister Hill Center, NLM  
Ms. Wei Ma, Office of Computer and Communication Systems, NLM  
Ms. Jennifer Marill, Division of Library Operations, NLM  
Dr. Clement McDonald, Lister Hill Center, NLM  
Mr. Dwight Mowery, Division of Extramural Programs, NLM  
Mr. Robert Mehnert, Office of Communication and Public Liaison, NLM  
Mr. David Nash, Office of the Director, NLM  
Dr. Aaron Navarro, Lister Hill Center, NLM  
Dr. Stuart Nelson, Division of Library Operations, NLM  
Dr. Arthur Petrosian, Division of Extramural Programs, NLM  
Dr. Steven Phillips, NLM Consultant  
Ms. Julia Royall, Office of the Health Information Program Development, NLM

Mr. Jerry Sheehan, Office of the Director, NLM  
Mr. Mark Siegal, Division of Extramural Programs, NLM  
Dr. Elliot Siegel, Office of Health Information Program Development, NLM  
Dr. Hua-Chuan Sim, Division of Extramural Programs, NLM  
Ms. Marti Szczur, Division of Specialized Information Services, NLM  
Dr. Neil Thakur, Office of the Director, NIH  
Dr. George Thoma, Lister Hill Center, NLM  
Dr. Frederick Wood, Office of Health Information Program Development, NLM

## **I. OPENING REMARKS**

Dr. Holly Buchanan, Chair of the NLM Board of Regents, welcomed the Regents, alternates, consultants, and guests to the 145th meeting of the Board. She welcomed especially Dr. Martin C. Harris to his first meeting as a Regent and Dr. Syed Ahmed, Director of the Center for Healthy Communities at the Medical College of Wisconsin, who is a member of the NIH Director's Council of Public Representatives. Dr. Ahmed participated in this morning's meeting of the Board Subcommittee on Outreach and Public Information.

## **II. REPORT FROM THE OFFICE OF THE SURGEON GENERAL, PHS**

Dr. Kenneth Moritsugu, Acting Surgeon General of the U.S. Public Health Service, said that the President has not yet nominated a new Surgeon General. He distributed to the Board copies of the recently released Surgeon General's Call to Action to Prevent and Reduce Underage Drinking. Dr. Moritsugu said that alcohol is the "drug of choice" among America's adolescents—more popular even than tobacco. Some 30 percent of our youth are involved in underage drinking. The science shows that those of our youth who start drinking before the age of 15 are five times more likely to have alcohol problems as adults. Drinking is linked to some 5,000 deaths a year among this age group. Many elements of society need to work together to address this problem—parents, family units, school systems, the community at large, local and Federal governments, and individual young people themselves. In response to a question, Dr. Moritsugu said that studies on underage drinking in the U.S. compared with other countries are largely anecdotal and not scientific.

## **III. CONSIDERATION OF MINUTES FROM PREVIOUS MEETING**

The Regents approved without change the minutes from the February 6-7, 2007 meeting.

## **IV. DATES FOR FUTURE BOARD OF REGENTS MEETINGS**

The Board of Regents will meet next on September 18-19, 2007. The Board meeting next winter is February 12-13, 2008. The dates of May 13-14, 2008, were adopted for the following meeting.

## V. REPORT FROM THE NLM DIRECTOR

Dr. Donald Lindberg reported that the Congress increased the NLM FY 2007 budget over the President's request. One aspect of the increase is that there is now direct funding of the NIH Roadmap initiative (NLM had previously contributed to this); another aspect is that the Congress will fund half the annual increase in staff salaries. Both of these are welcome developments, the Director said. In addition, there was an additional appropriation to NLM of \$5 million for NCBI resource needs. The FY 2008 budget is still under consideration. Dr. Lindberg reported to the Regents that NIH Director Zerhouni has re-constituted the high-level NCBI Resource Board to ensure that there will be wide and continuing multi-Institute fiscal support for NCBI information resources created on behalf of the NIH Institutes. There have been several recent appointments, including Joyce Backus as Deputy Chief of the Public Services Division, Jennifer Marill as Deputy Chief of the Technical Services Division, and David Gillikin as Chief of the Bibliographic Services Division. Dr. Jack Snyder has resigned as Associate Director of Specialized Information Services. Lister Hill Center Director Dr. Clement McDonald introduced several new staff members of that organization: Dr. Rebecca Williams, Assistant Director for ClinicalTrials.gov, and Dr. Erick Ducut, a postdoctoral fellow in the Office of High Performance Computing and Communications. NCBI Director David Lipman introduced to the Board staff scientist Avi Kimchi, who will be working on various software systems.

Dr. Lindberg reported to the Regents that Dr. Zerhouni has formed a trans-NIH Biomedical Informatics Coordinating Committee, chaired by the NLM Director. The Committee will deal with overall NIH policies concerning biomedical informatics and advise the NIH and Institute directors on biomedical informatics developments. The Committee will also be concerned with IT standards, a subject with which NLM has some experience. Jerry Sheehan, NLM Assistant Director for Policy Development, brought the Regents up to date about three bills in the Congress on the subject of clinical trials: Fair Access to Clinical Trials (S.467—Senators Dodd and Grassley); Enhancing Drug Safety and Innovation Act (S.484—Senators Enzi and Kennedy); and a companion bill to S.484 introduced in the House by Rep. Waxman (H.R.1561). Mr. Sheehan briefly described how the bills, if enacted, would likely affect NLM and the ClinicalTrials.gov database that NLM maintains. Dr. Lindberg reported that a House bill on genetic privacy was passed; action is pending by the Senate. A brief report about ClinicalTrials.gov showed that it is still heavily weighted toward interventionist drugs (as opposed, for example, to devices). The NLM Director said he was surprised to learn that the number of trials in the database sponsored by NIH and the number sponsored by companies are about equal.

Dr. Lindberg reported that NLM has commissioned a study by the Computer Science and Telecommunications Board of the National Academy of Sciences to examine whether advanced computer science techniques may solve some of the problems encountered in current health IT systems. That committee will study IT problems in the health care system as related to the issue of the electronic health record. Dr. William Stead, who will chair the study committee,

commented that the question we are asking is “would any amount of investment in today’s healthcare IT deliver the information infrastructure required to support the vision of the ‘IOM’s quality chasm’ report.” We are hoping that if we take the best of today’s computer science (which is not being applied today to health IT) “lightbulbs would go off” and short-term benefits would result. The other aspect is—even with the best of computer applications—what are the gaps that would remain on the frontiers of computer science. The study members plan to make a series of visits to a variety of health care delivery sites and then to prepare a report based on what they find. In response to a question from Dr. C. Martin Harris, Dr. Stead said that the Board will also, through sampling, look at different organizational “structures” and try to work out a matrix that will let us see the different factors in place. However, the focus of the initial report will be less on organizational structure and more on seeing if there are computer science breakthroughs that can deal with the varieties of structures that exist.

Dr. Lindberg reported on a recent “Michael E. DeBakey Seminar in Medicine” sponsored for 575 high school students by NLM at the New York University School of Medicine. This is the third such seminar, which features presentations from leaders in medicine, including videotaped remarks by Dr. DeBakey. Dr. Steven Phillips was the moderator. A new Turning the Pages Web site featuring Robert Hooke’s “Micrographia” (1665) has been released by NLM’s History of Medicine Division. It features beautiful illustrations of Hooke’s explorations of the natural world using the newly invented microscope. The Division is currently preparing for Turning the Pages for the Edwin Smith Surgical Papyrus, the oldest surviving surgical text, dating from about 1600 B.C.

## **VI. HEALTH DATA STANDARDS UPDATE**

Betsy L. Humphreys, NLM Deputy Director, presented background information about NLM’s involvement with the national health data standards agenda, a subject previously reported to the Board. NLM’s experience in this area is grounded in its work on the Unified Medical Language System, the Metathesaurus of which today is made up of 139 source vocabularies in 17 languages containing 1,373,000 concepts (almost 5 million “terms”). NLM began its participation in the U.S. effort to promote health data standardization in 1992 and, especially in recent years, NLM has played a particularly important role in marshalling Federal support for development, licensing, and free dissemination of standard clinical terminology. Examples are LOINC (Logical Observation Identifiers Names and Codes), RxNorm, and SNOMED CT. NLM managed the effort to establish a U.S.-wide license for SNOMED (Systematized Nomenclature of Medicine—Clinical Terms) which has broad coverage of diseases, symptoms, anatomy, procedures, etc. Because of its experience in this area, NLM has been designated as the HHS coordinating body for clinical terminology standards. The Board of Regents has been supportive of this development and the current Long Range Plan has a section on promoting the development of “Next Generation Electronic Health Records.”

Ms. Humphreys said that the most recent development is the transfer of ownership of SNOMED CT from the College of American Pathologists to a newly formed international organization. She

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briefly described the negotiations, led by the British that led to the transfer and the establishment of the International Health Terminology Standards Development Organisation (IHTSDO). She characterized NLM's goal in the outcome as "don't get less, don't pay more." The purchase from the College of American Pathologists was completed by IHTSDO on April 24, 2007. The agreement was announced by Health and Human Services Secretary Michael Leavitt on April 26 (<http://www.hhs.gov/news/press/2007pres/04/pr20070426a.html>). The nine partner countries are Australia, Canada, Denmark, Lithuania, the Netherlands, New Zealand, Sweden, the United Kingdom, and the U.S. Other countries are invited to join the IHTSDO. NLM is the U.S. Member of the new organization. There will be a meeting of IHTSDO and the SNOMED Editorial Board in May to discuss the transition. NLM will have a new contract with the IHTSDO by June 30. Ms. Humphreys described the principles around which the new organization was founded and that will guide the countries in their collaboration. She discussed the rights of Members and also the fee structure, noting that there is an arrangement for sponsoring developing countries. The IHTSDO has a General Assembly with each country having one vote, and a Management Board with up to 12 members. Ms. Humphreys is the U.S. member in the General Assembly, but because NLM will pay the U.S. membership fee via a contract, there can be no NLM member on the Management Board. The U.S. member on the Board is Dr. Andrew Wiesenthal of Kaiser. One advantage of the new arrangement is that it should allow SNOMED development to be more tightly integrated with feedback from real clinical implementations.

Ms. Humphreys also updated the Board on how LOINC and RxNorm are facilitating the Regional Health Data Exchange, in both Indianapolis and Memphis. RxNorm is also being used in the VA/DOD Clinical Data Repository/Health Data Repository; some 90 percent of the medications data was successfully transferred both ways between the two systems. As to the status of DailyMed (a database with drug package insert information previously reported to the Board): there are now more than 2600 records available; more than 100 are being added each week; there are 60,000 subscribers to the RSS feed; and there are connections between DailyMed and RxNorm, MedlinePlus, ClinicalTrials.gov, and PubMed.

Following Ms. Humphreys' presentation, Dr. C. Martin Harris asked about the transparency of the process for updating SNOMED under the new international arrangement. Ms. Humphreys said that they are aiming to achieve internationally acceptable tools so that anybody can look to see what has been put in the queue to be added to SNOMED. A standard training and vetting process will also contribute to expanding the number of people qualified to update SNOMED. Dr. Jordan Cohen asked what kind of commercial products were envisioned arising from the new arrangement. Ms. Humphreys said that Electronic Health Records systems were one example. U.S. vendors with international clients will be able to more easily market their products under the single uniform international license offered by the IHTSDO. We don't have information yet to know exactly where the biggest payoff from standardized health data will be. Dr. William Stead said that we are not trying to get *all* of medical records represented in any standard terminology. Progress is taking place on two fronts: we are beginning to capture information in

an increasingly rich set of multimedia forms and we are beginning to build in the code sets an “interlingua” to make computable the key concepts that we abstract from those rich information sources.

## **VII. PRESENTATION OF AWARDS**

Dr. Lindberg presented the NLM Director’s Honor Award to Kathleen Cravedi, of the Office of Communications and Public Liaison, for her “outstanding accomplishments in creating outreach opportunities on a national scale for the Library.” Two NLM Frank B. Rogers Awards were presented by Dr. Lindberg: Ms. Dianne Sun of the Office of Computer and Communications Systems “for significant contributions to NLM’s goal of providing access to quality health information by leading the technical development effort of the MedlinePlus Go Local project”; and Ms. Jiwon Kim, History of Medicine Division, “in recognition of exceptional contributions to the educational unit of the History of Medicine Division exhibitions program by...developing innovative educational materials for educators and students.”

Dr. Lindberg presented certificates to outgoing appointed Board members Dr. Holly Buchanan and Dr. Vasiliki Karlis, and ex officio member Mary Ann Tatman of the Veterans Health Administration. Dr. Buchanan received a ceremonial gavel for her service as chairwoman.

## **VIII. REPORT FROM THE DIRECTOR, NIH CLINICAL CENTER**

Dr. John I. Gallin, director of the NIH Mark O. Hatfield Clinical Center, said that the building is some four million square feet and houses some activities of 17 of the 27 NIH component organizations. He showed pictures of the Clinical Center and the two support facilities funded under public/private partnerships: the Children’s Inn and Safra Family Lodge. The Clinical Center has treated 350,000 patients since its opening in 1953. A new and expanded research facility was opened in April 2005. The Center has 234 beds, 1850 employees, and 1222 physicians. Dr. Gallin said that over the last decade there has been a shift away from inpatient days (-9%) to more outpatient visits (+30%) and day hospital use (+86%). Among the distinguishing features of the Clinical Center are that all patients are on a research protocol (1400 are presently active), there is no charge to patients, many of the conditions studied are rare, and many are long-term and high-risk. He showed pictures of some of the specialized facilities, and noted that the Center has no emergency room or obstetrics unit. The Clinical Center is set up to respond rapidly to emergencies, such as biodefense, anthrax, and avian flu. A new obesity facility has been opened, with three metabolic chambers.

Dr. Gallin highlighted some of the Clinical Center’s accomplishments over the years, including the first electronic medical information system to support clinical research, the first successful chemotherapy and immunotherapy for childhood leukemia, the first successful artificial mitral heart valve, and the first blood test for AIDS and hepatitis. He briefly described the various kinds of clinical trials going on at the Clinical Center. There are a variety of potential partners,

including university-based scientists and clinicians, U.S. pharmaceutical companies, foundations, and the new network of clinical translational science awardees. Dr. Gallin discussed and showed pictures of a number of special opportunities in such areas as training, phenotyping, informatics tools, and several high-tech “unique products” such as special cyclotrons. Many rare diseases are studied at the Clinical Center; a few examples are ankylosing spondylitis, Autoimmune Lymphoproliferative Syndrome (ALPS), Chediak-Higashi Syndrome, chronic granulomatous disease, and Cushing’s Syndrome. There is a heavy emphasis on clinical research training at the Clinical Center and Dr. Gallin described a number of the training programs. Long-distance learning is offered by the Clinical Center, and more than 5000 students world-wide have participated in their clinical research training programs. There is also a new training program in the management of clinical research for chief research officers, industrial officials, administrators, and principal investigators. Dr. Gallin described some of the informatics tools created by the Clinical Center, some with the help of NLM. The Clinical Research Information System (CRIS) is one of the earliest of these. Another tool now being introduced is a paperless Automated Protocol Writing System. Under a “bench to bedside” program, launched in 1999, there were 119 2-year awards, with both intramural and extramural recipients. Finally, Dr. Gallin discussed some of the challenges faced by the Clinical Center. These include patient care/management, financial constraints, co-mingling funds, ownership of intellectual property, and conflicts of interest.

In response to a question from Dr. Lindberg, Dr. Gallin discussed the Clinical Center’s role in disaster management. Nine-eleven prompted a dialogue between him and the Commander of the Navy’s medical facility in Bethesda and the development of a new emergency preparedness partnership that took advantage of the fact that NIH was “sandwiched” between the Navy Hospital on one side and Suburban Hospital on the other. Under the agreement, the NIH Clinical Center would absorb stable patients from the Navy and Suburban Hospital. To do this, the Clinical Center has converted enough space for 250 beds, essentially doubling the capacity. There have been a number of practice drills in preparation for a real-life emergency. Dr. Lindberg has been helpful in suggesting ways to electronically transport information between the institutions.

## **IX. DIGITALLY PRESERVING A HISTORIC MEDICO-LEGAL COLLECTION**

Dr. George Thoma, Chief of the Communications Engineering Branch of the Lister Hill National Center for Biomedical Communications, reported on NLM’s program to (in the words of the Long Range Plan recommendation) “preserve NLM’s collections in highly usable forms and contribute to comprehensive strategies for preservation of biomedical information.” Preservation is, in general, a team effort involving the Lister Hill Center, Library Operations, National Center for Biotechnology Information, and Office of Computer and Communications Systems. The present project discussed by Dr. Thoma is a collaboration between NLM’s LHC and History of Medicine Division (LO) and a historian in the Food and Drug Administration history office. Dr. Thoma said there is a wide range of collections at NLM that are candidates for preservation,

including papers, manuscripts, photos, and correspondence of famous scientists; biomedical journals, NLM Web pages, historic medico-legal documents, and medical videos. These materials come in many formats. The goal of this project is to find a cost-effective strategy to preserve digital materials, particularly in light of the expensive task of creating metadata for such materials. He discussed the development of automated techniques for extracting metadata that describe the content of the materials, migrating data from obsolete to better-supported formats, and exploiting external services. A sample Web page and a sample journal article were shown, each with different kinds of metadata noted. The research approach taken was to build a prototype system with the required functionality in a modular way, using open source software when it is available, developing additional modules as needed, and leveraging existing tools and services. This prototype system was used as a testbed in an experiment. Dr. Thoma then reported on the System for Preservation of Electronic Resources (SPER), an operational system built on the initial prototype design, in a project using a collection of FDA historical documents (65,000 “Notices of Judgment” from the late 19<sup>th</sup> and early 20<sup>th</sup> century). These documents are a valuable historical resource, containing the history of governmental efforts to ensure the safety and purity of foods, drugs and cosmetics. After the documents were scanned under contract by NLM, metadata fields were identified and records created. Dr. Thoma said that in a performance test using 8,888 TIFF pages (6,380 Notices of Judgment), metadata extraction was done in an average of 9.6 seconds per case.

## **X. COMPREHENSIVE DECISION SUPPORT SYSTEM FOR PREVENTIVE CARE FOR CHILDREN**

Dr. Paul Biondich, Assistant Professor of Pediatrics/Informatics, Regenstrief Institute, Indiana University School of Medicine, described his NLM grant-supported work in developing the decision support system known as CHICA—Child Health Improvement through Computer Automation. Dr. Biondich was an NLM Informatics Fellow at Regenstrief. Dr. Clem McDonald, Director of the Lister Hill Center, was his mentor there. Dr. Biondich is a general pediatrician and a self-described “computer geek.” There are many issues involving preventive pediatric care: including ensuring that each preventive topic is addressed for every child, how to prioritize the topics, and knowing what resources are available in a community. Dr. Biondich briefly discussed some of the solutions that have been tried, such as systems that prompt physicians and remind them of needed action. A more helpful system, he said, is one that would be able to collect coded data outside of the clinical encounter and integrate it into a medical record. Using the case of a hypothetical nine-month-old patient as a sample interaction, Dr. Biondich discussed how the CHICA system does this. The system, which was installed in November 2004, has undergone an evaluation of three aspects: the pre-screening data’s adjunct to routine clinical data as a way to generate reminders, the value of generating “just-in-time” handouts, and the automated ordering process. He described a first study of the system based on the subject of maternal depression with 2227 families enrolled. Early results of the data analysis are encouraging—the rate of clinicians documenting maternal depression was much higher in the intervention groups than in the control groups. Two other randomized trials currently taking

place are on preventive interventions for (1) tuberculosis, iron deficiency anemia, and lead toxicity and (2) an automated order intervention arm which will receive pre-printed order sheets for at-risk children. Dr. Biondich then described his “career-altering” experience in Kenya with an HIV care system and how that set the direction of and influenced his current work. For the future, he said that they plan to evaluate CHICA interventions randomized by site, continue evolving open medical record systems, and continue the development of large-scale decision-support systems. He thanked NLM and the other agencies who have supported his work. More information about Dr. Biondich’s work is on the Web at <http://openmrs.org>.

Following the presentation, Dr. Wayne Isom asked if this system will make pediatricians more efficient by decreasing the amount of time needed to figure out what is wrong with the patient. Dr. Biondich said that since the system is really designed for preventive care, that should, in theory, save quite a bit of time—physicians would have to do less “fishing” to assess if a child is eligible for some kind of preventive service. Dr. Charles Rice said that this is a critically important area and he applauds the open source approach of Dr. Biondich and his colleagues. Since so much depends on the interaction of the screening staff, the patient, and the care provider, how are cultural factors incorporated or accounted for? Dr. Biondich replied that an underappreciated aspect of preventive care is giving the patient an opportunity to influence the process of care. In this system we give them a sheet to fill out and we find that in many cases patients are the best estimators of what they are at risk for.

## **XI. EXTRAMURAL PROGRAMS REPORT**

Dr. Milton Corn, NLM Associate Director for Extramural Programs, notified the Board of Regents about the change in policy regarding the new requirement that all applications must be submitted to the Board for action.

Deputy Associate Director for Extramural Programs, Dr. Valerie Florance, reviewed the strategies being employed at NIH to shorten the time between receipt of a grant application and issuance of a grant award. Typically, this takes 9-10 months for an investigator-initiated project. At each step in the cycle, improvements are being made that shave weeks off the process. End-to-end automation of research grants administration has delivered a number of benefits already. For example, electronic submission of applications saves about 3 weeks, because paper applications no longer need to wait at the Center for Scientific Review to be scanned. Internet-assisted review, which is now used for all NIH grant reviews, allows scientific review administrators to complete the summary statement in about 4 weeks instead of the usual 6-8 weeks. Additional technology-enhanced review options could cut 2 or 3 more weeks from the review cycle. Dr. Florance noted that many Institutes now use the Early/Late Concurrence features of the Electronic Council Book (ECB) to shorten the time between review and Council concurrence. This can save 1-2 additional months. NLM EP staff propose to undertake an early concurrence pilot during summer 2007. Dr. Florance described briefly what would be involved in using the ECB this way and said she would report back to the BOR on the outcome of the

pilot.

**MEETING CLOSED FOR REVIEW OF GRANT APPLICATIONS - 3:50-4:15 P.M.**

**XII. PUBCHEM UPDATE: HIGHLIGHTS OF BIOASSAY SEARCH/ANALYSES TOOLS**

Dr. Stephen Bryant of the National Center for Biotechnology Information described NIH's Molecular Libraries Program as an important part of the wider NIH Roadmap Initiative. The Program has several components, including technologies for developing biology assays, a network of screening labs, and the PubChem database through which this information is made available. Integrating data from the Molecular Libraries Program with the many information resources of the NLM is a vital part of this effort. PubChem is a highly automated open repository that accepts contributions of electronic information from some 70 organizations. There are 10 million compound records (unique chemical structures) and 18 million substance records (contributed structure records) in PubChem to date. PubChem also contains results of biological activity testing in over 400 assays, a total of over 10 million individual test results (number of assays times number of substances tested per assay). Dr. Bryant took the Regents on a demonstration "tour" of the database. He said that some 30,000 scientists access PubChem each day.

Dr. Cynthia Morton said that the system is "fabulous," and it is exciting to learn not only what the future will bring, but to see what is available right now. Dr. Jordan Cohen commented that this work allows us to look at data that, at least on the surface, are not related, and find ways to tie them together. He noted that some of the assays NCBI is working with are quite old, and he raised the question of their reliability. Dr. Bryant said that assay data generated by the NCI in the 1970s was "solid," although today's screening technology is radically different. In response to a question from Dr. Lindberg, Dr. Bryant described how NIH selected the chemicals for screening.

**XIII. REDESIGN OF MEDLINEPLUS**

Joyce Backus, Deputy Chief of the Public Services Division, reported on the redesign of MedlinePlus that took place in March 2007. Using the MedlinePlus home pages (in both English and Spanish) as a guide, she showed the Regents and briefly described each of the categories of information provided by the system. She demonstrated several of the services, such as the Interactive Tutorials. Ms. Backus gave a timeline of growth, in terms of both information provided and Web usage, since the introduction of MedlinePlus in 1998. In 2006, 95.5 million unique visitors viewed some 820 million pages on the MedlinePlus site. She discussed how NLM learns from inspecting search logs and utilizing various commercial sources of information about our system, such as WebTrends, the American Customer Satisfaction Index (ACSI), and MediaMetrix/Conscore. NLM also receives direct input from the press and from users who write and phone us. As of March 17, 2007, the NLM was number nine on the list of all educational and

reference Web sites. Ms. Backus cited statistics: there are 220 million adults; 139 million are online; 116 million have been online for health information; and 70 million are looking for drug information. She then presented statistical data that showed how MedlinePlus rated high in the health-information-providing arena. NIH rates highest in usage among the .gov sites and NLM accounts for a huge part of the usage of NIH.gov. As for customer satisfaction, over the last few years, the ACSI quarterly report has rated MedlinePlus as the highest, or tied for highest, of all Federal Web sites. Thirty-five percent of MedlinePlus users reach NLM through Google; direct traffic is about 25 percent. NIH, other health sites, Yahoo, and other search engines account for the remainder. Ms. Backus said that cancer was the subject most searched in MedlinePlus, followed by allergies, diabetes, depression, and high blood pressure. She showed how the home page and health topic pages in MedlinePlus have evolved over the years. In 2003 MedlinePlus started the Go Local service, connecting users to health and social services in their area. As of this month, there are 21 Go Local sites covering approximately 30 percent of the U.S. population. Ms. Backus then showed the new MedlinePlus home page and a sample health topic page that have just been put online, and she discussed the reasons behind the various changes made on them. For example, the new pages are less text-intensive, have more white space, and there are more images and graphics. In summary, MedlinePlus is a highly successful, much used, and constantly improving health information resource.

Following Ms. Backus's presentation, Eileen Stanley commented that the updated MedlinePlus schema with its visuals and illustrations is excellent and will help users be clear about where they are and how to proceed through the site. She said that MedlinePlus is the premier collection of evaluated health information in the world, and the metrics presented bear this out. Dr. Karlis asked about the timing of the redesigns—how do you know when to do it? There is no clear-cut formula, Ms. Backus said. The bigger it gets the more difficult it gets and we always have to balance the need to improve the site versus the benefit of maintaining a stable and familiar service for the users.

#### **XIV. ENVIRONMENTAL HEALTH INFORMATION OUTREACH PROGRAM (EnHIOP)**

Marti Szczur, Acting Associate Director for Specialized Information Services (SIS), introduced the next two speakers: Dr. Melvin Spann and Dr. Henry Lewis, III. Dr. Spann, Executive Secretary of the Environmental Health Information Outreach Program (EnHIOP) is the former Associate Director of NLM's SIS and he was the prime mover in establishing the toxicology/environmental outreach that evolved into the EnHIOP. Dr. Henry Lewis III, current chairman of EnHIOP, is Professor of Pharmacy at Florida A&M University. Dr. Lewis has also been President of the Association of Minority Health Professional Schools and the National Pharmaceutical Association. Ms. Szczur also acknowledged the work of SIS's Cynthia Gaines, who oversees the project.

Dr. Melvin Spann gave a brief history of the EnHIOP project. He cited a number of surveys, studies, and publications in the late 1980s and early 1990s that dealt with the devastation of toxic waste and the exposure to toxic chemicals in minority communities. Dr. Spann proposed to NLM management that there be an outreach program to the minority community on the subject of toxic chemicals to see if NLM information resources on this subject could help in addressing some of these pressing problems. Eight member institutions of the Historically Black Colleges and Universities (HBCU) community were identified as the founding members of an advisory panel, and goals for the program were established: to increase awareness and usage of NLM files, provide instruction in their use, distribute information, and evaluate effectiveness. Dr. Spann outlined the steps in the evolution of EnHIOP, from earlier presentations to the minority health professionals' organization and the NLM Board of Regents, to the first Advisory Panel meeting (1991), to the introductory-level training classes and "train the trainers" classes, to the extension of the program to other HBCUs, Tribal Colleges, and Hispanic Minority-Serving Institutions.

Dr. Henry Lewis said that the mission of the EnHIOP program is to enhance the capacity of minority serving and academic institutions to reduce health disparities through the access, use and delivery of environmental health information on their campuses and in the communities they serve. This is done through awareness programs, training and use through curriculum incorporation, seminars, and special events at each institution. There is high-level involvement and cooperation between the administrative and academic sides. There are also strengthened institutional partnerships with libraries and other components such as Environmental Justice Centers, Poison Control Centers, Drug Information Centers and Centers of Excellence. Relations with community-based and faith-based organizations are established. There is increased participation in professional meetings and public forums through papers, posters, and panel discussions. In summary, EnHIOP is an NLM local and regional resource for training, exhibiting, and outreach. One outcome has been training delivered to HBCUs, tribal colleges, and Hispanic serving institutions, Dr. Lewis said. Another positive outcome has been to accelerate new Ph.D. degree programs in environmental toxicology and MPH programs at a number of the HBCUs. Next steps being considered, he said, are to reach out to more minority institutions, consider ways to incorporate disaster preparedness, and to consider exploring the role of climate change. EnHIOP will also develop a strategic plan and align it with NLM's new Long Range Plan for 1006–1016.

Dr. Lindberg thanked Dr. Spann for the outstanding way he got this program started. It was obvious from the beginning that there was a long way to go in reaching health professionals who serve minorities in these endangered communities—and much has been accomplished. Dr. Karlis noted that this program began not so long ago; it is remarkable that such a dire need could have existed so long without remedy. The statistics presented show that the program is "closing the loop quite nicely" and that it is encouraging to see the Ph.D. programs. How are the participants in these programs doing? Dr. Lewis said that a number of the graduates are working at CDC and the EPA and on the faculties of participating colleges and universities. Dr. Steven Phillips suggested that EnHIOP might want to consider forming a subcommittee to deal with disaster and

emergency planning.

#### **XV. REPORT FROM THE SUBCOMMITTEE ON OUTREACH AND PUBLIC INFORMATION**

Dr. Vasiliki Karlis, who chaired yesterday morning's meeting of the Subcommittee, said that the group heard from Dr. Donald King about the fourth issue of the MedlinePlus Magazine, the central focus of which is cancer. Distribution and support for the magazine were discussed. Also on the agenda was an update on the success of the Information Prescription Rx pilot program with the American Osteopathic Association, presented by Dr. Elliot Siegel and Kathleen Cravedi. Dr. Steve Phillips spoke about the recent symposium for high school science students in New York City mentioned yesterday by Dr. Lindberg in his presentation. Invited to join this meeting of the Subcommittee was Dr. Syed Ahmed, a member of the NIH Council of Public Representatives. Dr. Ahmed, who is Director of the Center for Healthy Communities at the Medical College of Wisconsin, talked about how the NLM and NIH can increase their involvement with communities. Finally, Dr. Karlis reported that there was a presentation about new public service announcements being distributed by NLM about MedlinePlus en español featuring Don Francisco, a well-known figure on Hispanic television.

#### **XVI. REPORT FROM THE NOMINATING COMMITTEE FOR BOARD CHAIR**

Mary Ann Tatman, who chaired the committee to nominate a chair for 2007–2008, said that she and her committee members (Dr. Charles Rice and Dr. Deanna Marcum) nominate Dr. Cynthia Morton as Chair of the Board of Regents. A motion to do so was made and Dr. Morton was elected unanimously.

#### **XVII. NLM'S EXPERIENCE WITH CYBER INTRUSION DETECTION, ANALYSIS, AND RESPONSE**

Dr. Simon Liu, Director of the NLM Office of Computer and Communications Systems, said that the tools used by hackers are becoming more and more sophisticated and automated, making it easier to attack systems. Today there are more than 8,000 "vulnerabilities" that present opportunities for hackers. Dr. Liu presented a profile of daily cyber intrusion into the NLM system—there were 144,000 events in April 2007. The attacks emanated from 113 countries; 30 percent came from within the U.S. The NCBI and NLM home pages are the primary targets. He discussed the problems in detecting intrusions in the huge amount of incoming data, describing it as finding "a needle in a haystack." He described the levels of access to NLM's system and the various methods employed by his staff to detect and deal with intrusions. The NLM Cyber Defense Process includes a continuing cycle of planning, detection, analysis, containment and eradication, and recovery and using the lessons learned to improve our security posture. Dr. Liu described how the 144,000 "events" per month were winnowed down to about 64 meaningful events for serious follow-up action. He then conducted for the Regents a live intrusion

demonstration and showed how it would be detected, intercepted, and dealt with.

Dr. Martin Harris asked, what is the real purpose of serious attacks? Dr. Liu said that there were many motives, including malicious attacks to bring down the service and attempts to discover personal data. Dr. Harris also asked how good NLM was at keeping up with the constantly changing methods and targets of hackers. Dr. Liu said that this is the most challenging part of the problem. NLM works closely with its partners in this matter; we constantly check to see if they have skipped anything and we test the system often for vulnerabilities. Dr. Harris said that the ability to impose criminal sanctions on hackers in the health care area has been an advantage. Although, Dr. Lindberg added, it is up to the NLM to provide data sufficient for a judge to be able to act. Dr. William Stead said there is also a concern about “unnoticed degradation of content”—either as a result of intentional or unintentional acts. Dr. Haym Hirsh said that people who try to “break the system” are sometimes trying to create a denial of service, sometimes attempting financial gain, and sometimes do it just for a “trophy” or the “glory” of it. He asked whether they were doing random selection of Web sites or were they specifically targeting NLM. Dr. Liu said that based on the data they had the hackers generally are not specifically targeting NLM.

### **XVIII. ADJOURNMENT**

The Board of Regents meeting was adjourned at 12:00 p.m. on May 9, 2007.

#### **ACTIONS TAKEN BY THE BOARD OF REGENTS:**

- Approval of the February 6-7, 2007 Regents Minutes
- Approval of May 13-14, 2008 Meeting Dates

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

Donald A.B. Lindberg, M.D.  
Director, National Library of Medicine

Holly Buchanan, Ed.D.  
Chair, NLM Board of Regents