DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH

NATIONAL ADVISORY COUNCIL FOR BIOMEDICAL IMAGING AND BIOENGINEERING

Summary of Meeting[1]

January 22, 2010

The National Advisory Council for Biomedical Imaging and Bioengineering (NACBIB) was convened for its 22nd meeting on January 22, 2010, at the Bethesda Marriott Suites in Bethesda, Maryland. Dr. Roderic I. Pettigrew, Director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB), presided as Council chairperson.

In accordance with Public Law 92–463, the meeting was open to the public from 9:00 a.m. to 12:30 p.m. for review and discussion of program development, needs, and policy. The meeting was closed to the public from 1:30 p.m. to 2:45 p.m. for consideration of individual grant applications.

Council members present:
Dr. Philip Alderson, Saint Louis University, St. Louis, MO
Ms. Rebecca M. Bergman, Medtronic, Inc., Minneapolis, MN
Dr. Richard L. Ehman, Mayo Clinic, Rochester, MN
Dr. Katherine W. Ferrara, University of California, Davis, Davis, CA
Dr. Gary H. Glover, Stanford University, Stanford, CA
Dr. Augustus O. Grant, Duke University Medical Center, Durham, NC
Dr. Mae C. Jemison, Biosentient Corporation, Houston, TX
Dr. Percival McCormack, University of Illinois at Chicago, Chicago, IL
Dr. Buddy Ratner, University of Washington, Seattle, WA

Council member present via conference call:
Dr. Cherri Pancake, Oregon State University, Corvallis, OR

Council members absent:
Dr. David Satcher, Morehouse School of Medicine, Atlanta, GA
Dr. David Skorton, Cornell University, Ithaca, NY

Ex officio members present:
Dr. John McGrath, National Science Foundation, Arlington, VA
Dr. P. Hunter Peckham, U.S. Department of Veterans Affairs, Cleveland, OH
Dr. Anne Plant, National Institute of Standards and Technology, Gaithersburg, MD
Dr. James G. Smirniotopoulos, Uniformed Services University of the Health Sciences, Bethesda, MD

Ex officio members absent:
Dr. Francis Collins, National Institutes of Health, Bethesda, MD
Ms. Kathleen Sebelius, U.S. Department of Health and Human Services, Washington, DC
Dr. Andrew Watkins, Centers for Disease Control and Prevention, Atlanta, GA

[1] For the record, it is noted that members absent themselves from the meeting when the Council is discussing applications (a) from their respective institutions or (b) in which a conflict of interest may have occurred. This procedure only applies to applications that are discussed individually, not to "en bloc" actions.

Executive Secretary:
Dr. Anthony Demsey

Also present:
NIBIB staff present for portions of the meeting:

Mr. Angelos Bacas
Dr. Richard A. Baird
Ms. Sheila Barrett
Ms. Angela Burks
Ms. Barbara Cantilena
Dr. Xiaoyuan Chen
Dr. Zohara Cohen
Ms. Shirley Coney-Johnson
Dr. Richard Conroy
Ms. Nancy Curling
Ms. Chris Ann Davis
Mr. Nicholas Dicrosta
Mr. Jeff Domanski
Mr. Antoine Durham
Dr. Henry Eden
Ms. Angela Eldridge
Dr. Zeynep Erim
Ms. Cheryl Fee
Ms. Carol Fitzpatrick
Dr. David George
Ms. Marie Gill
Ms. Pam Glikman
Dr. Valery Gordon
Dr. Ruth Grossman
Ms. Jude Gustafson
Dr. John Haller
Dr. John Hayes
Ms. Eunica Haynes
Dr. William Heetderks
Dr. Lori Henderson
Mr. Shabriya Horton
Dr. Rosemarie Hunziker
Dr. Albert Jin
Dr. Chris Kelley
Ms. Mary Beth Kester
Dr. Peter Kirchner
Dr. Brenda Korte
Dr. Lixin Lang
Dr. Richard Leapman
Dr. Albert Lee
Dr. Guoying Liu
Dr. Hector Lopez
Dr. James Luo
Dr. Alan McLaughlin
Mr. Todd Merchak
Mr. Larry Morton
Mr. Joe Mosimann
Dr. Peter Moy
Ms. Mary Patonek
Dr. Grace Peng
Dr. Karen Peterson
Dr. Roderic I. Pettigrew
Dr. Mary Rodgers
Ms. Jessica Ryan
Dr. Belinda P. Seto
Dr. Hari Shroff
Mr. Shaun Sims
Dr. Paul Smith
Ms. Casey Stewart
Dr. Manana Sukhareva
Ms. Florence Turska
Ms. Stacy Wallick
Mr. Kwesi Wright
Ms. Li-Yin Xi
Dr. Yantian Zhang
Dr. Ruixia Zhou

Non-NIBIB NIH Employees:
Dr. Sally Amero, NIH Office of the Director
Dr. Ann Asaby, Foundation for the NIH
Dr. Alessandra Bini, Center for Scientific Review
Dr. Jason Barnett, National Institute of Allergy and Infectious Diseases
Dr. Keith Crutcher, Center for Scientific Review
Dr. Keyvan Farahani, National Cancer Institute
Dr. Angela Hvitved, NIH Office of the Director
Dr. James Lawler, National Institute of Allergy and Infectious Diseases
Dr. Abraham Levy, National Center for Research Resources
Dr. Jason Paragas, National Institute of Allergy and Infectious Diseases

Dr. David Songco, National Institute of Child Health and Human Development

Members of the public present for portions of the meeting:
Mr. Matt Campbell, Microsoft Corporation
Mr. Benjamin Corb, American Institute for Medical and Biological Engineering
Ms. Allyson Harkey, NOVA Research Company
Mr. Ricardo Henriques, Event Technology Solutions
Mr. Rick Hunsen, Digicon
Mr. Vhic Mata, Event Technology Solutions
Mr. Jason Michelitch, National Capital Captioning
Mr. Peter Neupert, Microsoft Corporation
Mr. Khien Nguyen, Event Technology Solutions
Mr. Michael Peters, American College of Radiology
Ms. Kristen Peterson, Microsoft Corporation
Ms. Phylis Ruz, Microsoft Corporation
Dr. Mark Schnitzer, Stanford University
Mr. Sean Seerey, Microsoft Corporation
Dr. Khan Siddiqui, Microsoft Corporation

I. Call to Order: Dr. Anthony Demsey

Dr. Demsey called to order the 22nd meeting of the National Advisory Council for Biomedical Imaging and Bioengineering (NACBIB). He reminded attendees that the morning session of the meeting was open to the public, welcomed attendees, and introduced Dr. Pettigrew, who formally welcomed all participants.

II. Director's Remarks: Dr. Roderic Pettigrew

A. New Members

Dr. Pettigrew introduced new Council member Dr. Buddy Ratner. Dr. Ratner is Professor of Chemical Engineering and Bioengineering and holds the Michael L. and Myrna Darland Endowed Chair in Technology Commercialization at the University of Washington. A member of the National Academy of Engineers, Dr. Ratner's research focuses on developing biomaterials for medical devices.

B. Retiring Members

Dr. Pettigrew thanked Dr. Augustus Grant for his service to the Council. Dr. Grant's original 4-year term ended in August 2009, but he was given a 6-month extension. On behalf of the entire Council, Dr. Pettigrew expressed appreciation for his service and wished him well.

C. Budget Update

Under the budget signed into law in December 2009, the National Institutes of Health (NIH) budget increased 2.7 percent, slightly below the Biomedical Research and Development Price Index (BRDPI) of 3.3 percent. The number of applications to NIBIB has increased; today's meeting would evaluate 14 percent more applications than were reviewed last January, and the May Council will evaluate 17 percent more applications than in May 2009. The 14 percent increase over last January is independent of American Recovery and Reinvestment Act (ARRA) funding. These increases appear to be commensurate with increases at other Institutes/Offices/Centers.

The number of applications scoring at higher percentiles also has increased. The number of applications scoring at the 13th percentile for today's meeting equals the number that scored at the 23rd percentile in January 2009. This increase represents a funding challenge that has forced NIBIB to modify its 2010 financial management plan significantly. Whereas last year NIBIB paid at the 19th percentile, for the rest of this year NIBIB anticipates paying at the 13th percentile.

D. NIH Update

Dr. Pettigrew announced the death of Dr. Ruth L. Kirschstein. Dr. Kirschstein spent over 50 years in public service and was known for her early work in vaccine development. She oversaw U.S. Food and Drug Administration approval of the Sabin oral polio vaccine. A champion of gender and ethnic diversity in biomedical research, Dr. Kirschstein was the first woman to serve as Director of an NIH Institute, heading the National Institute of General Medical Sciences for approximately 20 years. She later served as NIH Deputy Director (1994–2000) and Acting NIH Director (1993, 2000–2002). In 2002, the National Research Service Awards were renamed the Ruth L. Kirschstein National Research Service Awards in her honor.

E. Presidential Visit

President Obama's visit to the NIH campus in September 2009 underscored the appropriation of ARRA funding to NIH. This appropriation—$10 billion over 2 years—is the single largest boost to biomedical research in history. In his presentation, President Obama discussed the role of genomics in the future of medicine and health care, emphasizing the need for new technologies and improvements in the health care system to deliver new treatments and cures.

F. HHS Funding

The Department of Health and Human Services (HHS) awarded an additional $3 million to NIBIB specifically for comparative effectiveness research. NIBIB received some of these funds to support an RFA on imaging and clinical decision-making processes aimed at reducing overutilization of imaging technologies and optimizing ionizing radiation technologies to improve the benefit-to-risk ratio of radiation doses. Grants must be issued by the end of FY2010 and will cover 2 years of work.

G. Research in the News

Two NIBIB-funded scientists were featured during a *60 Minutes* program on regenerative medicine that aired December 13, 2009. Dr. Stephen Badylak, Professor of Surgery and Director of Tissue Engineering at the McGowan Institute for Regenerative Medicine at the University of Pittsburgh, discussed his work with extracellular matrices and esophageal tissue engineering. Dr. Anthony Atala, Professor of Urology and Director of the Wake Forest Institute of Regenerative Medicine, demonstrated replacement organs, including an ear and a beating heart valve. Dr. Pettigrew shared video clips from the program.

H. Other NIBIB-Supported Research

Drs. Adam Maxwell and Zhen Xu and their team at the University of Michigan have developed a therapy for deep vein thrombosis using ultrasonic-induced cavitation. The technique, called *histotripsy*, uses short, high-intensity pulses to break down soft tissue or clots by forming bubbles in a liquid under pressure. Researchers successfully guided cavitation inside an occluded porcine vein, disintegrating clot sections to eliminate the clot until blood could flow again.

III. Toward Patient-Centric Health—Integrating Imaging, Biotechnologies, and Clinical Data: Mr. Peter Neupert

Dr. Pettigrew introduced Mr. Peter Neupert, Corporate Vice President of Microsoft's Health Solutions Group. Mr. Neupert identifies opportunities for Microsoft technology innovations to empower users and enable transformation of health care. He is active on the Institute of Medicine's Roundtable on Evidence-Based Medicine and the boards of the Pacific Health Summit Advisory, the NIH Foundation, and GlobalScholar.com, an organization that provides online help to schools, teachers, students, and parents.

The Health Solutions Group approach to improving health is a scalable, patient-centric health system that connects care across the community and inside an institution, giving professionals and consumers access to appropriate data at the right time. Such a system would empower health care workers who are frustrated by present transactional technology, and allow consumers to be more active in making decisions about diagnostics and treatment. System components include Microsoft HealthVault, a patient-controlled, cloud-based health data repository that connects consumers to medical information based on their data. HealthVault is free to consumers.

Microsoft developed the Amalga Unified Intelligence System to connect data-gathering systems and facilitate reuse of data sets, while reducing disk space and processing costs. In the research setting, Amalga can shorten dissemination time by enabling faster image processing. In the clinic, Amalga can bring together imaging and other data (e.g., MRI, CT, EKG) for simultaneous viewing. After recognizing patient and physician identification cards, software can pull data from the patient's health record and the hospital's enterprise system. If a patient desires a copy of an image file or lab result, the doctor "drags and drops" the data into the patient's health record.

Amalga Life Sciences (ALS) is designed to enhance workflow in research-based institutions. Amalga and ALS work from the nano scale (e.g., quantum dots, multi-photon microscopy), through the micro (e.g., ultrasound) and macro (e.g., fMRI, temporal sampling) scales, to the aggregate scale (e.g., longitudinal studies, patient stratification). In collaborations with several research institutions, ALS demonstrated its ability to automate tedious tasks, thereby reducing errors and time spent.

Advancing Imaging: From Research to Practice

Dr. Khan Siddiqui, Microsoft's Principal Program Manager, Medical Imaging, described the Group's imaging research. Their approaches to resolving medical imaging issues often take inspiration from visual computer applications. For example, streaming and other high-end imaging could enable researchers to view three-dimensional images in rotation without image degradation. Metadata and segmentation techniques used in photographic and video applications might be used to create a predictive system that selects an organ in an image and forwards data to visualization or surgical planning applications. Users can input annotation and image mark-ups, which can be used to create intelligent overlays and support creation of structured reports.

Microsoft's advanced medical home workflow system shares data across care settings for chronic disease management. The system is based on a set of rules that follow from analyses of an institutional data set and communicate with the user via screening reminders. HealthVault automatically connects data from glucometers, scales, pedometers, spirometers, and blood pressure cuffs to electronic medical records, institutional systems, or decision support systems.

Control and management of patient data in HealthVault are entirely up to the patient. Microsoft has no special privileges as owner of the data store. To protect patient privacy, the system

defaults to non-consent. Patients must use specific NIH- or Centers for Disease Control and Prevention (CDC)-branded applications to give consent for researchers to use any of their data. This consent can be granular; for example, a patient can limit consent to medication data only.

Microsoft is developing low-cost point-of-care diagnostic devices, such as PDA-based triage systems, for use in developing countries. A Bayesian engine created by Microsoft researchers has been adopted by Robertson Technologies and deployed in Haiti and India as a triage tool for less-skilled workers in the field. Researchers supported by the Bill and Melinda Gates Foundation are developing an interface for illiterate users.

IV. Review of Council Procedures and Regulations

Dr. Demsey noted for the record that a quorum was present for this Council meeting. Council members Drs. David Skorton and David Satcher and *ex officio* member Dr. Andrew Watkins were unable to attend. Dr. Cherri Pancake would participate in the Closed Session via teleconference.

He welcomed visitors, members of the science press, and members of scientific society constituencies, and thanked Ms. Carol Fitzpatrick and Ms. Pam Glikman for planning the meeting.

A. Council Regulations, Policies, and Procedures

Dr. Demsey summarized elements of the Government in the Sunshine Act and the Federal Advisory Committee Act that govern all Advisory Council meetings. These Acts require the U.S. Department of Health and Human Services to open Advisory Council meetings to the public except when proprietary or personal information is discussed. To comply with these regulations, the NACBIB meeting is open to the public for all but the review of individual grant applications. Dr. Demsey reviewed conflict of interest, confidentiality, and lobbying guidelines.

B. Future NACBIB Meeting Date

The next NACBIB meeting is scheduled for May 21, 2010, with the site to be determined. Dr. Demsey asked Council members to inform him about conflicts with upcoming meeting dates.

C. Approval of the September 11, 2009, NACBIB Meeting Minutes

A motion was forwarded and seconded to approve the minutes of the September 11, 2009, NACBIB meeting. The minutes were approved unanimously.

D. Council Operating Procedures

A motion was forwarded and seconded to approve Council operating procedures without modification. The operating procedures were approved unanimously.

V. Report of the Strategic Plan Workgroup: Dr. Richard Ehman

Dr. Richard Ehman summarized the Strategic Plan Workgroup's meeting held prior to the NACBIB meeting. NIBIB staff presented two concept plans to the Workgroup. The first concept plan, prepared by Drs. Richard Baird and Zeynep Erim, outlined a team-based design project in undergraduate biomedical imaging and bioengineering education. A program announcement would provide enhanced resources for team design projects/assignments through the R25 research education mechanism. The Workgroup expressed enthusiasm about this concept and suggested emphasizing the multidisciplinary aspects of the activity.

The second concept plan, prepared by Drs. William Heetderks and John Haller, would provide administrative supplements to support collaborations between investigators in the United States and India who are working on low-cost technology to address common health care challenges, particularly chronic disease. The plan would identify promising areas within the existing NIBIB portfolio that could contribute to global health care. The Indian government would provide support for Indian investigators to collaborate with the NIBIB-funded investigators supported through these supplements. The Workgroup supported this initiative with some minor reservations about the plan to build a Web site for disseminating information about the program.

The Workgroup reviewed a reformulated Strategic Plan that consolidates the ten current goals into five.

Goal 1: Discovery and Basic Research. The Workgroup supports the recommendation to require some products of NIBIB research to provide more quantitative information that would impact health care and medical decision making. The Workgroup recommends offering periodic workshops to identify promising areas for discovery activity.

Goal 2: Development of New Technology and Devices. The Workgroup supports continued emphasis on research aimed at solving clinical problems and endorses plans to: (1) encourage work toward advancing clinical practice and research that use health information technology and (2) support development of simulation and multiscale modeling activities for health and disease. The Workgroup recommends refocusing on development of high-impact, low-cost technologies that have high value in the clinical environment.

Goal 3: Translation of New Technologies and Devices. The Workgroup endorses focused strategies to promote translation.

Goal 4: Interdisciplinary Education. The Workgroup endorses new strategies to increase diversity in the researcher ranks. Specific programs outside of NIBIB were cited as models.

Goal 5: Expansion of Public Knowledge of NIBIB's Work. It is useful and important that NIBIB do more to publicize its work. The Workgroup suggests tapping into the methods and resources of professional societies that share similar goals.

The Workgroup recommends that NIBIB leadership continue the objective assessment of outcomes of the current Strategic Plan and explicitly connect the Strategic Plan to the five new themes that Dr. Collins has laid out as his vision for NIH.

Discussion

A Council member noted that the recent earthquake in Haiti illustrates the need to develop technology to deliver health care in a variety of settings.

It was also noted that many smaller colleges are located in underserved communities where high-value technology would be particularly effective. A staff member pointed out that NIBIB is cosponsoring a Small Business Innovation Research-focused initiative aimed at the development of technology for underserved communities.

VI. Of Mice, Men, and Microscopes—Visualizing Cellular Dynamics in Awake, Behaving Animals and Humans: Dr. Mark J. Schnitzer

Dr. Pettigrew introduced Dr. Mark Schnitzer, an assistant professor of biological sciences and applied physics at Stanford University and the Center for Biomedical Engineering and Sciences, and an investigator of the Howard Hughes Medical Institute. Dr. Schnitzer received an NIH

Director's Pioneer Award in 2007. His work focuses on cellular and cerebellar dynamics that underlie neuronal memory in learning, as well as how experience and environment alter neuronal properties.

Impact of Telecommunications and the Internet on Biomedical Imaging

The growth of telecommunications and the Internet has provided the impetus for development of extremely advanced physical devices, some of which have biomedical imaging applications. In 2002, Dr. Schnitzer and his colleagues began using optical needles and fibers based on telecommunications device technology to build a high-resolution lens; a multitude of minimally invasive, relatively inexpensive micro-optical probes resulted.

Studying Deep Brain Tissue

Conventional and even two-photon microscopy techniques cannot reach cells that lie deep below the brain surface where light cannot penetrate. Dr. Schnitzer has developed microendoscopes based on gradient index (GRIN) microlenses that employ two basic contrast mechanisms—epifluorescence and laser scan pattern—to provide a powerful, fast technique for examining areas of the brain previously inaccessible to optical imaging.

Dr. Schnitzer has employed micro-optics to study angiogenesis in a mouse model for glioma. In humans, primary gliomas typically arise deep in the brain. Using microendoscopes to examine normal deep brain tissue, Dr. Schnitzer compared the angiogenic dynamics in normal hemispheres with those that had received inoculation of tumor cells. This work has produced one of the largest data sets on angiogenesis collected for any tumor type, and Dr. Schnitzer is hopeful that the study's basic assay can be applied to studies of other diseases that afflict deep tissue.

Colleagues Drs. Scott Delp and Michael Llewellyn, and Mr. Robert Barretto are studying sarcomeres, the basic contractile units of striated muscle, in live humans. Motor control and sarcomere structure are disrupted in many neuromuscular diseases. The team is employing a laser beam and the intrinsic coherent frequency doubling of light in muscle, and plans to develop a diagnostic and therapeutic tool to examine sarcomeres in living humans.

Studying Tissue Over Time

Building on this work, Dr. Schnitzer developed a chronic mouse preparation that allows repeated or time-lapse imaging in an individual mouse for up to one year. Members of Dr. Schnitzer's team— Drs. Tony Ko and Juergen Jung, and Mr. Robert Barretto—are using implanted micro-optics in a mouse model to look at how brain cells evolve over the course of development, aging, learning, or repeated treatment. At the highest resolution, the team has been able to observe individual synapses, which inspired them to refine the endoscopes such that individual dendritic spines are now visible, presenting the opportunity to better understand the dynamics of learning and memory.

Possible applications for the time-lapse preparation include long-term studies of brain disease, examination of the cerebellum of behaving mice for motor control issues, and investigation of sarcomere dynamics in striated muscle in live humans.

Studying Brain Tissue in Awake Behaving Subjects

Ideally, studies of cells in the live brain are conducted in subjects who are free to move about and behave normally. However, the bulky instruments used in conventional microscopy techniques often impede a researcher's ability to observe cells in freely moving subjects.

Dr. Schnitzer has developed two complementary methods to enable this type of study: a miniaturized microscope mounted on the head of a mouse that may move freely, and a conventional light microscope with a mouse trained to behave in place.

In the first method, light from an external source is piped through specialty telecommunications fibers to a microscope on the mouse's head; other fibers route optical signals to a computer that pieces together the image. To accommodate movement of the mouse, the devices include a commutator that allows the fiber to pivot freely. The images must be unrotated computationally to produce a stable record of events. One version of the device uses silicon micro-machined mirrors with two-photon imaging. Batch fabrication of the mirrors will help proliferate the technology.

A complementary one-photon device includes planetary gears that focus three different microlenses. A long version will be used for areas deep in the brain and a shorter version will examine the brain surface. At 1.1 grams, this device is extremely light and returns images at a very high speed.

Dr. Axel Nimmerjahn, a member of Dr. Schnitzer's laboratory team, has used recent versions of this microscope to record neocortical circulation. The application is designed to monitor calcium levels in the cerebellar vermis, an area implicated in motor control and locomotion.

Glia, which make up 90 percent of the cells in the brain, are also visible with this microendoscope. Dr. Schnitzer has collected images of glia closely intertwined with neurons and hugging the capillaries. The device records neuronal spikes as well as glial calcium signals and blood flow changes over time. Dr. Schnitzer's findings suggest that glia may play a role in neurovascular control.

Massively Parallel Brain Imaging

The goal of the Massively Parallel Brain Imaging Project is to decipher neuro-circuit function. Dr. Schnitzer's endoscopes will be used to generate a large-scale array of 96 different fly brains. Dr. Schnitzer uses LASIK-like surgical manipulations to microdissect the fly cuticle with precision and speed—20 seconds compared with the 40 minutes a skilled researcher needs for manual dissection. Array analysis will provide brain images and data about brain function. Behavioral experiments that use Dr. Schnitzer's technologies enable multiple observations of individual neuronal responses to visual and olfactory stimuli. Combined imaging and behavioral studies could lead to a better understanding of decision making and behavioral choices.

Based on his ongoing success with technology transfer, Dr. Schnitzer encouraged the Council and the biomedical community to consider how to leverage off-the-shelf devices and other technology from telecommunications and other fields.

VII. Adjournment

The open session of the NACBIB meeting was adjourned at 12:30 p.m.

VIII. Closed Session

The grant application review portion of the meeting was closed to the public in accordance with provisions set forth in Section 552b(c)(4) and 552b(c)(6), Title 5, U.S. Code and 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. appendix 2). The closed session was adjourned at 2:45 p.m.

Certification:

We certify that, to the best of our knowledge, the foregoing minutes and attachments are accurate and complete.[2]

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Anthony Demsey, Ph.D.
Executive Secretary,
National Advisory Council for Biomedical Imaging and Bioengineering
Director,
Office of Research Administration
National Institute of Biomedical Imaging and Bioengineering

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Roderic I. Pettigrew, Ph.D., M.D.
Chairperson,
National Advisory Council for Biomedical Imaging and Bioengineering
Director,
National Institute of Biomedical Imaging and Bioengineering

[2] These minutes will be approved formally by the Council at the next meeting on May 21, 2010, and corrections or notations will be stated in the minutes of that meeting.