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DBMI's External Advisory Board: Guiding the Way



Marion J. Ball



Atul J. Butte



Christopher G. Chute



Joyce A. Mitchell



Andrew W. Moore



Edward H. Shortliffe

The first meeting of the DBMI External Advisory Board (EAB; see member list on page 6) was held on September 26, 2007. Chaired by Atul Butte, MD, PhD from Stanford University, the board participated in a daylong event to critique the first year's activity of the Department of Biomedical Informatics (DBMI) at the University of Pittsburgh School of Medicine.

Michael J. Becich, MD, PhD, department chair, introduced Arthur Levine, MD, senior vice chancellor for the Health Sciences and dean of the School of Medicine at the University of Pittsburgh, who described the evolution of biomedical informatics and the significance of forming this important new department.

The board reviewed presentations on the department's research portfolio, training program, faculty demographics and recruitment, corporate-sponsored research, and finances and administrative operations.

The EAB meeting was attended by the strategic planning group for DBMI (Becich, Wendy Chapman, PhD, Gregory Cooper, MD, PhD, Rebecca Crowley, MD, MSIS, and Charles Dizard) which was joined by Michael Wagner, MD, PhD, director of the Real-time Outbreak and Disease Surveillance (RODS) Laboratory; G. Daniel Martich, MD, UPMC chief medical information officer, associate chief medical officer, and executive vice president of eRecord; Sean O'Rourke, UPMC chief information officer, product lines and services; and James Levin, MD, PhD, chief medical information officer of Children's Hospital of Pittsburgh of UPMC.

Conclusions reached by the board included the following:

- DBMI in Pittsburgh is already one of the top biomedical informatics programs in the nation.
- DBMI's portfolio of funded grants is among the top in the country. Recommendations included a more specialized research-focused agenda and more research in computational biomedicine (bioinformatics).
- The DBMI Training Program needs to have greater emphasis on research and publications among its trainees, thereby facilitating greater success in recruiting high-caliber applicants.
- Recommendations regarding the DBMI faculty emphasized the need for a greater number of publications and senior-level faculty recruits.
- The administrative and financial organization of DBMI was rated as excellent.

A follow-up conference call was scheduled for December 12, 2007, and the next annual full board meeting is scheduled for September 23-24, 2008.

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Randolph A. Miller, MD

Randolph A. (Randy) Miller, MD, is the Donald A.B. and Mary M. Lindberg University Professor and former chair of the Department of Biomedical Informatics at the Vanderbilt University School of Medicine. As one of the early leaders in biomedical informatics, Miller began his distinguished career in the early 1970s as a medical student, resident in internal medicine, and junior faculty member at the University of Pittsburgh School of Medicine. In 1986, Miller was appointed chief of the new Section of Medical Informatics in the Division of General Internal Medicine, where he provided the strategic and programmatic leadership for the Department of Medicine's efforts in biomedical informatics at the University of Pittsburgh until he left for Vanderbilt in 1994.

Miller recounted the excitement of being a medical student and resident at the time when some of the most creative minds in the world were collaborating in Pittsburgh. In 1972-73, in his second year of medical school, Miller began working with Jack Myers, who had served as chair of the Department of Medicine from 1955 to 1970, and with Harry Pople Jr., who had trained under the early pioneers of artificial intelligence—Allen Newell and Herbert Simon at Carnegie Mellon University.

Gerhard Werner, former dean of the School of Medicine introduced Myers and Pople to each other, and the two began collaborating in 1971 to develop a computer program that would use the techniques of artificial intelligence to assist physicians in making clinical diagnoses. Their revolutionary work predated the formation of academic units for biomedical informatics. With Myers and Pople, Miller coauthored the 1975 publication "DIALOG: A Model of Diagnostic Logic for Internal Medicine," which was published in the *Proceedings of the Fourth International Joint Conference on Artificial Intelligence*. Thus began the official recognition of Miller's entrance into an academic career in biomedical informatics. Because of a complaint from lawyers representing Lockheed Corp., which was developing a computer system named DIALOG and had reserved the name for its use, the University of Pittsburgh diagnostic system was renamed the INTERNIST-1 program. It was one of the first computerized models for diagnostic decision support in a broad field such as internal medicine.

With continued research and development, the INTERNIST-1 computer-based system for medical diagnosis culminated with the 1982 *New England Journal of Medicine* article, authored by Miller with Myers and Pople, titled "INTERNIST-1, an Experimental Computer-based Diagnostic Consultant for General Internal Medicine."



Randolph Miller, MD

In 1985, Miller was the primary force behind the development of the microcomputer-based successor to INTERNIST-1, a program called Quick Medical Reference, or QMR. The following year, Miller led the University of Pittsburgh's major participation in the highly successful national project to develop the Unified Medical Language System (UMLS).

By the mid-1980s, rapid advances were being made nationally in biomedical informatics and federal support was growing. With funding from the National Library of Medicine (NLM), in 1987, Miller became the principal investigator and director of the University of Pittsburgh's Biomedical Informatics Training Program. The training program entered its 20th year in 2007 and continues to be a vibrant cornerstone of the Department of Biomedical Informatics at the University.

Since joining the faculty at the Vanderbilt University School of Medicine in 1994, Miller has continued to provide national leadership in the ever-expanding field of biomedical informatics. He was elected president of the American Medical Informatics Association (AMIA) for 1994-95, was president of the American College of Medical Informatics (ACMI) in 2003, and is the editor-in-chief of the *Journal of the American Medical Informatics Association (JAMIA)*. He received the William J. Darby Award for translational research from Vanderbilt University in 2004 and the Donald A.B. Lindberg Award for Innovation in Informatics from the American Medical Informatics Association in 2007. In 2006, Miller was elected to membership in the Institute of Medicine of the National Academies.

Miller stands out as one of the most significant national contributors to the discipline of biomedical informatics. Locally, Miller provided critical academic and personal leadership in building biomedical informatics at the University of Pittsburgh and helped lay the foundation for the successful formation of the Department of Biomedical Informatics in 2006.

Department Grant Support, Direct and Indirect

New Grants Since July 2007 • Total: \$6,782,602

Faculty	Grant Description	Program Start Date	Program End Date	TOTAL PERIOD		
				Direct	Indirect	Total
Michael Becich, MD, PhD	Mesothelioma Translational Research (NIH-CDC U19)	09/01/07	08/31/08	\$602,463	\$231,920	\$834,383
Michael Becich, MD, PhD	caBIG Task Order #22	07/01/07	03/31/08	\$93,099	\$45,153	\$138,252
Wendy Chapman, PhD	NLP Foundational Studies and Ontologies (R01)	07/16/07	06/30/11	\$807,369	\$391,574	\$1,198,943
Wendy Chapman, PhD	Feasibility of a Natural Language Process (R21)	08/03/07	07/31/09	\$290,940	\$117,797	\$408,737
Rebecca Crowley, MD, MSIS	The ODIE Toolkit (NIH R01)	09/01/07	08/31/11	\$1,547,203	\$601,829	\$2,149,032
Rebecca Crowley, MD, MS	The Cancer Training Web (NIH-R25)	07/01/07	06/30/12	\$1,427,943	\$89,798	\$1,517,741
Michael Wagner, MD, PhD	Applications Service Provider - PA Dept of Health	07/01/07	06/30/08	\$395,828	\$139,686	\$535,514
Total				\$5,164,845	\$1,617,757	\$6,782,602

Publications (alphabetized by first author)

July–December 2007

www.dbmi.pitt.edu/events/publications.html

Becich M.J. 2007. Lessons Learned from the Shared Pathology Informatics Network (SPIN): A Scalable Network for Translational Research and Public Health. *Journal of the American Medical Informatics Association* 14: 534-535.

Chapman W.W., Dowling J.N. 2007. Can chief complaints detect febrile syndromic patients? *Advances in Disease Surveillance* 3(6).

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El Saadawi G.M., Tseytlin E., Legowski E., Jukic D., Castine M., Fine J., Gormley R., Crowley R.S. 2007. A natural language intelligent tutoring system for training pathologists: implementation and evaluation. *Advances in Health Sciences Education: Theory and Practice* Oct 13; [Epub ahead of print]

Gopalakrishnan, V. 2007. Prior Knowledge for Discovery Proteomics Data Interpretation. Peer-reviewed poster/short paper. The Eleventh Annual International Conference on Computational Molecular Biology (RECOMB).

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Mohanty S.K., Parwani A.V., Crowley R.S., Winters S., Becich M.J. 2007. The importance of pathology informatics in translational research. *Advances in Anatomical Pathology* Sep;14(5): 320-2.

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Tsai M., Wagner, M. 2007. An Evaluation of Biosurveillance Grid-Dynamic Algorithm Distribution across Multiple Computer Nodes. In: *Proceedings of the Fall Symposium of the American Medical Informatics Association*.

Dental Informatics: Moving Ahead

“The sky is the limit.” This is how Titus Schleyer, associate professor and director of the Center for Dental Informatics at the University of Pittsburgh, describes the opportunities in dental informatics. The Center for Dental Informatics is a young part of the biomedical informatics community here at the University. Only established in 2002, it currently has three faculty members, five graduate students, and seven staff members.

The passion for informatics among the members of the center, however, goes back a long way. Schleyer was programming precursors of today’s personal computers in 1978 and began his career as a faculty member in informatics at Temple University in 1989. There, Heiko Spallek joined him in 1996 to form the first academic dental informatics department in the United States. At the same time, Temple’s Department of Dental Informatics began its collaboration with the University of Pittsburgh’s Center for Biomedical Informatics on the National Library of Medicine (NLM)-funded training program in biomedical informatics.

This existing collaboration was the main reason for Schleyer and Spallek to move to the University of Pittsburgh to establish the Center for Dental Informatics at the School of Dental Medicine. “Temple was the perfect place to start in dental informatics,” recalls Spallek. “The University of Pittsburgh, however, allowed us to take our research in informatics to the next level.” While the pair had other opportunities for continuing their informatics careers, they chose the University of Pittsburgh because of its demonstrated institutional commitment to informatics, strong clinical environment, and significant opportunities for collaboration.

Over time, some of the opportunities became accomplishments. While Schleyer and Spallek arrived at the University of Pittsburgh with only a paltry amount of grant support, the center’s funding for the current year totals more than \$518,000. In the past year alone, the center received two National Institutes of Health (NIH) R21 grants (one in collaboration with DBMI) and a portion of the University’s Clinical and Translational Science Award. While historically the center had enrolled only two MS students in the dental informatics concentration of the Biomedical Informatics Training Program, it now has three PhD and two MS students.

With an increasing number of students and additional grant funding, the center has significantly expanded its research activities. “We are now moving into a period of conceiving and developing innovations for clinical practice in dentistry,” says Schleyer. “Earlier, we were just trying to get a handle on how dentists were using technology in practice. Now, we are working on changing the tools they use.” A good example is the center’s prototype for a three-dimensional charting



system for general dentistry. The system, which recently was described in a cover article of *The Journal of the American Dental Association* (August 2007), is intended to take patient documentation for general dentists into three dimensions. In a few years, Schleyer expects, dentists will be able to take advantage of high-fidelity photorealistic 3-D representations of the teeth, gums, and bony structures of their patients. The research team expects that this approach will improve clinical decision making and documentation significantly.

Three-dimensional modeling is not the only project on which the center is working. Thankam Thyvalikakath, an assistant professor, is heading a project to reconceptualize the design of computer-based patient records for dentistry. In a series of studies, she demonstrated that today’s dental practice management systems have significant usability problems and are poorly engineered for the work flow of clinical dental care. Thyvalikakath is using methods from cognitive science, human-computer interaction, and user-centered design to develop a system that is much better adapted to the way clinicians work than most of today’s systems.

Adding value to today’s dental software applications includes other cutting-edge projects, such as the development of a natural language processing interface for dictating dental examinations and the evaluation and restructuring of dental terminologies. The center also is pursuing early work on integrating evidence-based dental resources into practice software, the measurement of clinical errors, and clinical decision support.

The establishment of the Department of Biomedical Informatics in 2006 provided a lot of momentum for dental informatics as well. Clearly, the coming recruitment of both established as well as junior informatics researchers will enrich the collaborative

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Q & A with Constantin Aliferis, MD, PhD

PhD, 1998, Intelligent Systems Program, Biomedical Informatics

Q: What has your role been at Vanderbilt University since you joined the faculty there in 2000?

A: In 2001, I founded the Discovery Systems Laboratory (www.dsl-lab.org) and continue to serve as director. I maintain a primary appointment in biomedical informatics and secondary appointments in cancer biology, biostatistics, and computer science. One of my most significant contributions was as architect and founding director of Vanderbilt's MS/PhD program in biomedical informatics. Especially important was being able to emphasize advanced mathematical and statistics courses and establish a strong quantitative and computer science base early in the student's training experience. I feel it is very important for biomedical informatics graduates to have a strong technical foundation.

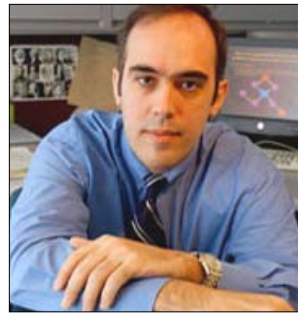
Q: What are your most memorable experiences from your days at The University of Pittsburgh?

A: Having Greg Cooper as an advisor and working on extremely novel computational causal discovery with Bayesian networks methodology shaped my research career. Climbing the hill to upper campus to see Bruce Buchanan was a metaphor; it was like going to see the wise sage on the top of the mountain. I also enjoyed being part of Greg's remarkable collaboration with Carnegie Mellon University (CMU) 'giants' of computational causal discovery—Peter Spirtes, Clark Glymour, and their group. Besides the fantastic faculty and research projects at large, a lot of great students who subsequently highly distinguished themselves also were around, and interactions with them were inspiring and fun. It was an incredible time to be in Pittsburgh.

Q: What do you see as the most important challenges in teaching today?

A: The biggest challenge for universities is to remain places of inquiry, learning, and discovery. What percent of university budgets is directly related to education in high-profile institutions? 10 percent? 20 percent? Unfortunately, many universities today appear to function like for-profit institutions and to focus more on growth of revenue/endowment dollars as end goals rather than education, learning, and discovery. There is definitely a shift in focus that hurts less-fundable but possibly more critical long-term discoveries. More broadly, I feel that we need to balance increased productivity requirements with quality of life without degrading or destroying the social and natural environments.

For additional information, please visit our Web site at www.dbmi.pitt.edu.



Constantin Aliferis



Gilan El-Saadawi

Q & A with Gilan El Saadawi, MD, PhD, MS

MED, 2004, Assistant Professor, Department of Health and Community Systems, School of Nursing, and Department of Biomedical Informatics, School of Medicine, University of Pittsburgh

Q: What is your research interest?

A: My biomedical informatics/clinical trials research is an attempt to match patients to clinical trials, beginning with the initial visit to the physician's office. Although 80 percent of children are enrolled in clinical trials, only 2–4 percent of the adult population is enrolled. The lack of written protocol standards is the most problematic obstacle, followed by physician awareness and extracting health information from existing electronic systems.

Q: How did you get started in biomedical informatics?

A: I began work in biomedical informatics under the mentorship of James Harrison, MD, PhD, and later received a fellowship in the Pittsburgh Biomedical Informatics Training Program. My introduction to the American Medical Informatics Association (AMIA) began with a poster, followed by an accepted publication and, most recently, an invitation to be a panelist at the AMIA 2007 Annual Symposium.

I also have been mentored by and am currently collaborating with Rebecca Crowley, MD, who helped introduce me to the practical part of the field. The best way to find mentors and collaborators is to express an interest in their work. An established and funded researcher will help to bring you along.

Q: What is the difference between biomedical informatics and information technology?

A: Biomedical informatics is the bridge between information technology and the medical profession. Computer science people and information technology people live in their own worlds, as do doctors and nurses. A biomedical informatician brings them together with effective translation and communication.

Q: What advice would you give to current fellows in the training program?

A: Take it slowly until you identify your interests and establish an area of expertise. I also suggest that students identify a senior faculty mentor who can assist with and provide direction through the initial grant writing and publication process. Also, keep in mind the importance of outside collaborations. Early in my fellowship, I joined an AMIA working group and became engaged with a broader group working in biomedical informatics.

DBMI's External Advisory Board includes the following members: continued from page 1

Marion J. Ball, EdD

Professor Emerita, Johns Hopkins University
School of Nursing
Fellow, IBM Center for Healthcare Management
Ball was chosen for her background in health informatics infrastructure development and her strong background in nursing informatics. Her experience as a corporate consultant also is highly valued.

Atul J. Butte, MD, PhD

Assistant Professor of Medicine, Pediatrics, and
(by courtesy) Computer Science
Stanford University
Director, Center for Pediatric Bioinformatics,
Lucile Packard Children's Hospital
Butte was chosen for his background in translational bioinformatics and computational biomedicine. He was elected the chair of the DBMI EAB.

Christopher G. Chute, MD, DrPH

Professor and Chair, Division of Biomedical Informatics
Mayo Clinic College of Medicine
Chute was chosen for his background in ontology and standards in biomedical informatics as well as his longtime leadership in the American Medical Informatics Association (AMIA).

Joyce A. Mitchell, PhD

Professor and Chair, Department of Biomedical Informatics
University of Utah
Mitchell was chosen for her background in training in biomedical informatics and in human genetics. She also is a new chair of the Department of Biomedical Informatics at the most established department in the country.

Andrew W. Moore, PhD

Director, Pittsburgh Engineering Office
Google Inc.
Moore was selected because of his strong computer science background and knowledge of corporate sponsored research and academia/industry relations.

Edward H. Shortliffe, MD, PhD

Dean, University of Arizona College of Medicine – Phoenix
Shortliffe was invited to be an EAB member because of his long-term commitment to academic biomedical informatics and because of his extremely successful track record of building nation-leading research programs at Stanford and Columbia universities.

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Dental Informatics: Moving Ahead continued from page 4

environment for dental informatics. However, other factors are just as crucial to the continued success of the center. The center will have to keep on competing successfully for scarce NIH and other research funding. In order to expand its research capacity, it will have to establish additional positions for faculty, postdocs, and graduate students. Finally, deepening the nascent collaborations with industry should help it translate many of its research accomplishments into products and services that are used in clinical dentistry.

The center undoubtedly faces an exciting future, but also many challenges. "Translating ideas into reality is hard," says Schleyer. "But, we got it to work with the Center for Dental Informatics, so there is hope."

If you would like to learn more about the Center for Dental Informatics, its personnel and activities, please visit <http://di.dental.pitt.edu>.



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