

## Q & A with Mehmet Kayaalp, MD, PhD

PhD, 2003, Intelligent Systems Program, Biomedical Informatics  
Staff Scientist, U.S. National Library of Medicine

**Q: What have you been doing since receiving your degree from Pitt?**

A: I started working at the National Library of Medicine (NLM) as a staff scientist. I am currently in the Cognitive Science Branch of the Lister Hill National Center for Biomedical Communications, which is a research division of NLM. I have been working on various projects, the most recent of which is the personal health records that we have been developing at Lister Hill.

**Q: What are your most memorable experiences from your days as a Pitt student?**

A: It is difficult to pick and choose memorable experiences that I had at Pitt—there are so many—but the times that I cherish the most were the times that I had with Greg Cooper and Bruce Buchanan. I had the privilege to have them as my mentors. Although they were very different in style, both were great role models to me. Greg also was my advisor, who held my hand from start to finish and led me along the way to a joyous academic adventure with respect, honesty, and integrity. Undoubtedly, he has been the most influential figure over my academic persona.

**Q: How did your training and education benefit your career?**

A: Although I had formal training in medicine and computer science before arriving at Pitt, my PhD studies in the Intelligent Systems Program and my medical informatics training at the Center for Biomedical Informatics bridged those disparate areas.

**Q: What are your research interests?**

A: My main research interest is the representation of uncertain information and knowledge using probability theory and artificial intelligence. My current application area is in developing personal health records.

**Q: Anything about your personal life you would like to share?**

A: My wife, Banu, was pregnant when we were in Pittsburgh. Kaan, our son, was born a few months after we moved to the Washington, D.C., area. He will soon be 5 years old. His age is now an indicator of how long it has been since we left Pittsburgh, a place full of fond memories and close friendships.

For additional information, please visit our Web site at [www.dbmi.pitt.edu](http://www.dbmi.pitt.edu).



Mehmet Kayaalp and son Kaan



Deb Lewis and daughters Emme (left) and MeiMei

## Q & A with Deb Lewis, EdD, MPH, MS

MPH, 1999, Master of Public Health Program, Biomedical Informatics Concentration  
Associate Professor, Department of Nursing, Slippery Rock University of Pennsylvania

**Q: What have you been doing since receiving your degree from Pitt?**

A: I was program coordinator for the Nursing Informatics Program at the University of Pittsburgh before accepting a position last year as associate professor of nursing at Slippery Rock University.

**Q: What are your most memorable experiences from your days as a Pitt student?**

A: The colleagues and faculty with whom I worked at the Center for Biomedical Informatics (CBMI).

**Q: How did your training and education benefit your career?**

A: It was a privilege to be among such esteemed colleagues. My time at Pitt CBMI provided me with the knowledge I needed to achieve my professional goals.

**Q: What is your role on the faculty of Slippery Rock University?**

A: My work is directed toward consumer health informatics, with a focus on the delivery of computer-based assessment and the design of consumer health Web sites. I received National Institutes of Health funding for the development of the Caring Connection, which is a family-focused Web-based communication resource for parents of children with cancer.

**Q: What are your research interests?**

A: My research interests continue to focus on the provision and development of new strategies to improve the delivery of consumer health informatics.

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

A: Enjoy your time and take full advantage of all the wonderful opportunities that exist for learning and networking.

**Q: Is there anything about your personal life you would like to share?**

A: I have two wonderful girls who are growing up beautifully and who keep my life full and very busy.



# Informatics Today



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DEPARTMENT OF  
BIOMEDICAL INFORMATICS



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## Developing a System to Detect Adverse Drug Events in the Nursing Home Setting



Steven Handler, MD, MS, CMD, a doctoral fellow in the Department of Biomedical Informatics, is leading a research effort to explore the use of a clinical event monitoring system to detect and reduce the number of adverse drug reactions (ADRs) among nursing home residents. ADRs can be defined as unintended or noxious responses to a prescribed drug. A clinical event monitor is an automated clinical decision support system that provides feedback to health care professionals that a potential ADR is present, based on information available in an electronic format.

The Centers for Disease Control and Prevention's National Health Care Surveys report that, in 2004, there were 16,100 nursing homes in the United States, with 1.73 million beds and 1.49 million current residents. The chance of nursing home placement is currently 45 percent for those older than 65, and the number of people requiring nursing home placement is expected to double by 2020.

In nursing homes, it is estimated that ADRs occur between 1.19 and 7.28 times per 100 resident months. This translates into approximately 2 million ADRs occurring annually in U.S. nursing homes and has an estimated cost of more than \$7.6 billion annually. Data from large studies suggest that nearly half of these ADRs are preventable and as many as 80 percent are associated with problems with medication monitoring.

Comprehensive chart review has been the standard for detecting and researching ADRs. This process can be time and cost intensive, but a functional clinical event monitoring system is a tool that has been shown to detect ADRs accurately and in a cost-effective manner.

The design of a clinical event monitoring system requires an agreed-upon set of standards or signals that the program will use to determine the presence of a clinical event. Handler and his colleagues approached this design challenge by intensively searching the published literature for potential signals that represent a potential ADR. This search of 29 publications yielded a list of 80 potential signals. The 80 signals were placed in four categories: laboratory and medication combination signals, medication concentration signals, antidote signals, and Resident Assessment Protocol (RAP) signals.

With the list of potential ADR signals in hand, Handler and his colleagues enlisted the help of a panel of experts in geriatrics. The panel's task was to reach a consensus on which of the 80 signals would most likely be associated with a potential ADR in the nursing home setting. The panel consisted of physicians, pharmacists, and advanced practitioners such as physician assistants and nurse-practitioners.

The panel of experts completed a two-round Delphi survey via the Internet and reached consensus on 40 signals. Of these, 15 were laboratory and medication combination signals, 12 were medication concentration signals, 10 were antidote signals, and three were RAP signals. The complete results of this work were published in the May 2008 issue of the *Journal of the American Geriatrics Society*.

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## Richard A. Bankowitz, MD, MBA, FACP

Richard Bankowitz, vice president and medical director for health care informatics at Premier, Inc., has devoted his career to improving health care quality at the national level. A board-certified internist and a medical informaticist, Bankowitz promotes rigorous, data-driven approaches to quality.

Bankowitz earned his MD degree at the University of Chicago Pritzker School of Medicine in 1983. Later that year, he began an internal medicine residency program at the University of Pittsburgh. At the time, Gerald Levy, MD, was chair of the Department of Medicine, and Michael Karpf, MD, was chief of the Division of General Internal Medicine.

Bankowitz chose Pitt for its good reputation for residency training in general internal medicine but did not know about the early research activities in biomedical informatics taking place at Pitt at that time. In the second year of his residency training program, Bankowitz met Randy Miller, MD. Miller led the Department of Medicine's efforts in biomedical informatics and would later be appointed chief of a new section of informatics within the Division of General Internal Medicine.

During his internal medicine residency, Bankowitz decided he wanted to teach and go into academic medicine, but he was unsure how to pursue that path. Karpf suggested a fellowship divided equally between general internal medicine and research activities. Karpf knew of Bankowitz's interest in "computer stuff" and suggested he talk with Miller about doing research in this area. Bankowitz began working with the informatics team during the third year of his residency and, upon completion of his residency, began a fellowship under Miller's supervision.

During Bankowitz's fellowship, Miller received funding from the U.S. National Library of Medicine (NLM) to begin a formal training program in biomedical informatics. Bankowitz and Ronnie Parker, MD, another resident in general internal medicine, became the first NLM-funded graduate medical informatics trainees at Pitt.

In 1988, Bankowitz and Parker completed their fellowships and joined the Pitt faculty of medicine in the section of medical informatics. Bankowitz considered focusing on clinical activities over teaching because of the difficulties in doing both. He took a job in applied medical informatics research as director of clinical evaluative sciences for the University HealthSystem Consortium (UHC) in Oak Brook, Ill., a suburb of Chicago, where he was responsible for directing projects on comparative clinical benchmarking. Bankowitz became a fellow of the American College of Physicians in 1994.

Bankowitz stayed with UHC for the next 12 years, serving as senior director of clinical informatics, director of clinical information management, and director of clinical evaluative sciences. He managed and grew the largest comparative data



Richard A. Bankowitz, MD, MBA, FACP

set on academic medical centers ever assembled, the UHC clinical database. Nearly all such centers in the nation subscribe to the UHC clinical database, available since 1988, which allows collaborative benchmarking of performance in clinical quality and efficiency. During his years in Chicago, Bankowitz returned to the University of Chicago, both as a lecturer in the faculty of medicine and as a student in the Graduate School of Business, where he earned his MBA.

In 2006, Bankowitz joined CareScience, a division of Quovadx, as vice president and medical director. He was responsible for strategy, product delivery, consulting, sales, and advocacy across the organization. CareScience had a strong tradition of methodological rigor in using comparative data, an attractive feature to Bankowitz.

In 2007, CareScience was acquired by Premier, a hospital alliance of more than 1,700 members, where Bankowitz now serves as vice president and medical director in health care informatics, Premier's second-largest division. He provides thought leadership and clinical expertise and fosters relationships with senior clinicians who are engaged in quality efforts.

Bankowitz urges current biomedical informatics trainees not to be dissuaded from following their interests. In 1988, there was not a lot of interest in how biomedical informatics related to public health, but today, research in this area is important, and much is being done.

Bankowitz also advises trainees about the critical need to increase understanding of the information currently stored in health care systems and how it can be used to improve patient safety and quality of care. There are tremendous opportunities for research in this area.

While at Pitt, Bankowitz was able to craft his training to suit his interests in health care economics, public health, and learning to use and analyze large databases. The statistical methodology he learned at Pitt is something he uses every day.

Read more about Bankowitz's career in the online edition of *Informatics Today* at [www.dbmi.pitt.edu](http://www.dbmi.pitt.edu).



# Department Grant Support, Direct and Indirect

New Grants Since January 2008 • Total: \$663,908

Faculty	Grant Description	Program Start Date	Program End Date	TOTAL PERIOD		Total
				Direct	Indirect	
Michael Becich, MD, PhD	Whole Slide Imaging (Digital Pathco LLC)	4/1/08	3/31/09	\$47,525	\$24,475	\$72,000
Brian Chapman, PhD	Automated Detection of Thromboembolic Disease in CT Images (NIH R01)	3/1/08	2/28/11	\$200,000	\$95,170	\$295,170
Michael Wagner, MD, PhD	RODS Biosurveillance Service (PA Dept of Health)	1/1/08	6/30/11	\$238,344	\$58,394	\$296,738
<b>Total</b>				<b>\$485,869</b>	<b>\$178,039</b>	<b>\$663,908</b>

## DBMI Publications

January 1, 2008–March 31, 2008

### Primary Faculty and Fellows

Bartos, C.E., D.B. Fridsma, B.S. Butler, L.E. Penrod, M.J. Becich, and R.S. Crowley. "Development of an Instrument for Measuring Clinicians' Power Perceptions in the Workplace." *J Biomed Inform* (2008).

Chapman, W.W., J.N. Dowling, and G. Hripsak. "Evaluation of Training with an Annotation Schema for Manual Annotation of Clinical Conditions from Emergency Department Reports." *Int J Med Inform* 77, no. 2 (2008): 107-13.

Ganapathiraju, M., N. Balakrishnan, R. Reddy, and J. Klein-Seetharaman. "Transmembrane Helix Prediction Using Amino Acid Property Features and Latent Semantic Analysis." *BMC Bioinformatics* 9 Suppl 1 (2008): S4.

Lustgarten, J.L., C. Kimmel, H. Ryberg, and W. Hogan. "Epo-Kb: A Searchable Knowledge Base of Biomarker to Protein Links." *Bioinformatics* 24, no. 11 (2008): 1418-9.

Wu, T.S., F.Y. Shih, M.Y. Yen, J.S. Wu, S.W. Lu, K.C. Chang, C. Hsiung, J.H. Chou, Y.T. Chu, H. Chang, C.H. Chiu, F.C. Tsui, M.M. Wagner, I.J. Su, and C.C. King. "Establishing a Nationwide Emergency Department-Based Syndromic Surveillance System for Better Public Health Responses in Taiwan." *BMC Public Health* 8 (2008): 18.

Yin, M., S. Bastacky, U. Chandran, M.J. Becich, and R. Dhir. "Prevalence of Incidental Prostate Cancer in the General Population: A Study of Healthy Organ Donors." *J Urol* 179, no. 3 (2008): 892-5; discussion 95.

### Secondary Appointment and Adjunct Faculty

Agarwal, V., B.F. Branstetter IV, and J.T. Johnson. "Indications for Pet/Ct in the Head and Neck." *Otolaryngol Clin North Am* 41, no. 1 (2008): 23-49, v.

Ahmad, A., and B.F. Branstetter IV. "Ct Versus Mr: Still a Tough Decision." *Otolaryngol Clin North Am* 41, no. 1 (2008): 1-22, v.

Branstetter IV, B.F. "Case Reports: A Premature Demise." *AJR Am J Roentgenol* 190, no. 1 (2008): W80; author reply W81.

Branstetter IV, B.F. "Topics in Ent Imaging. Preface." *Otolaryngol Clin North Am* 41, no. 1 (2008): xiii-xiv.

Burgansky-Eliash, Z., H. Ishikawa, and J.S. Schuman. "Hypotonous Malignant Glaucoma: Aqueous Misdirection with Low Intraocular Pressure." *Ophthalmic Surg Lasers Imaging* 39, no. 2 (2008): 155-9.

Dhir, R. "Tissue Microarrays: An Overview." *Methods Mol Biol* 441 (2008): 91-103.

Dhir, R., N.P. Gehi, R. Agarwal, and Y.E. More. "Oral Isotretinoin Is as Effective as a Combination of Oral Isotretinoin and Topical Anti-Acne Agents in Nodulocystic Acne." *Indian J Dermatol Venereol Leprol* 74, no. 2 (2008): 187.

Fraioli, R.E., B.F. Branstetter IV, and F.W. Deleyiannis. "Facial Fractures: Beyond Le Fort." *Otolaryngol Clin North Am* 41, no. 1 (2008): 51-76, vi.

Fridsma, D.B., J. Evans, S. Hastak, and C.N. Mead. "The BRIDG Project: A Technical Report." *J Am Med Inform Assoc* 15, no. 2 (2008): 130-7.

Grzybicki, D.M., S.S. Raab, J.E. Janosky, C. Vrbin-Turcsanyi, S. Bruno, R.J. Zarbo, C.H. Stone, F.A. Meier, K.R. Geisinger, and A.J. Gavin. "Anatomic Pathology and Patient Safety: It's Not an Error: It's a Diagnostic Misadventure!" *Am J Clin Pathol* 129, no. 1 (2008): 167-8; author reply 69.

Lain, K.Y., A.R. Daftary, R.B. Ness, and J.M. Roberts. "First Trimester Adipocytokine Concentrations and Risk of Developing Gestational Diabetes Later in Pregnancy." *Clin Endocrinol (Oxf)* (2008).

Lee, M.T., A. Parwani, R. Humphrey, R.G. Hamilton, D.I. Myers, and B. Detrick. "Gamma Heavy Chain Disease in a Patient with Diabetes and Chronic Renal Insufficiency: Diagnostic Assessment of the Heavy Chain Fragment." *J Clin Lab Anal* 22, no. 2 (2008): 146-50.

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Morgan, M.B., B.F. Branstetter IV, D.M. Lionetti, J.S. Richardson, and P. J. Chang. "The Radiology Digital Dashboard: Effects on Report Turnaround Time" *J Digit Imaging* 21, no. 1 (2008): 50-8.

Patel, V., B.L. Hood, A.A. Molinolo, N.H. Lee, T.P. Conrads, J.C. Braisted, D.B. Krizman, T.D. Veenstra, and J.S. Gutkind. "Proteomic Analysis of Laser-Captured Paraffin-Embedded Tissues: A Molecular Portrait of Head and Neck Cancer Progression." *Clin Cancer Res* 14, no. 4 (2008): 1002-14.

Philips, B.J., R. Dhir, J. Hutzley, M. Sen, and U.P. Kelavkar. "Polyunsaturated Fatty Acid Metabolizing 15-Lipoxygenase-1 (15-Lo-1) Expression in Normal and Tumorigenic Human Bladder Tissues." *Appl Immunohistochem Mol Morphol* 16, no. 2 (2008): 159-64.

Raab, S.S., and D.M. Grzybicki. "Technology and Process and Cervical Cancer Prevention." *Am J Clin Pathol* 129, no. 2 (2008): 187-9.

Xiao, W., Q. Zhang, G. Habermacher, X. Yang, A.Y. Zhang, X. Cai, J. Hahn, J. Liu, M. Pins, L. Doglio, R. Dhir, J. Gingrich, and Z. Wang. "U19/Eaf2 Knockout Causes Lung Adenocarcinoma, B-Cell Lymphoma, Hepatocellular Carcinoma and Prostatic Intraepithelial Neoplasia." *Oncogene* 27, no. 11 (2008): 1536-44.

Xiao, Z., T.P. Conrads, G.R. Beck, and T.D. Veenstra. "Analysis of the Extracellular Matrix and Secreted Vesicle Proteomes by Mass Spectrometry." *Methods Mol Biol* 428 (2008): 231-44.

Zickmund, S.L., R. Hess, C.L. Bryce, K. McTigue, E. Olshansky, K. Fitzgerald, and G.S. Fischer. "Interest in the Use of Computerized Patient Portals: Role of the Provider-Patient Relationship." *J Gen Intern Med* 23 Suppl 1 (2008): 20-6.

## Advancing Practice, Instruction, & Innovation through Informatics

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## The SlideTutor Project

The award-winning medical education system SlideTutor sprang from the experience of **Rebecca Crowley**, MD, MSIS, an assistant professor of biomedical informatics, intelligent systems, and pathology at the University of Pittsburgh.

“Throughout my own medical training, I spent a lot of time asking myself, ‘How can I possibly learn all of this? There isn’t enough time,’” recalls Crowley, who developed SlideTutor with her team at the Medical Tutor Laboratory at the University of Pittsburgh Department of Biomedical Informatics (DBMI). “I used to marvel at how fighter pilots and nuclear power plant operators are trained. They have a chance to reach mastery on simulators before they are ever asked to make decisions in potentially dangerous real-life situations.”

Crowley wanted to do the same thing for medical training: “A big part of the reason that I went into biomedical informatics was that I knew I would need to combine advances in education, cognitive science, and artificial intelligence to create this kind of a system.”

Students use SlideTutor to examine virtual slides on a computer desktop as they would view real slides under a microscope. The student can offer descriptions and diagnoses and create a pathology report. The system offers explanations if it detects a mistake, provides advice when the student is lost, tracks the student’s learning, and adapts the way it interacts and chooses cases to fit the student’s needs.

Several peer-reviewed publications from the Medical Tutor Laboratory have shown students are able to improve their diagnostic and reporting performance by a factor of four after as little as four hours using the system.

There are now 300 tutor cases in dermatopathology. The Medical Tutor Laboratory plans to add more than 1,000 cases in a variety of other domains over the next five years with the help of a grant from the National Cancer Institute (NCI).

“We’ve been so fortunate to receive strong support from the National Library of Medicine, NCI, and the Agency for Healthcare Research and Quality,” says Crowley, who hopes that, one day, this kind of training will be used throughout medical education.

The Medical Tutor Laboratory has grown since its beginning in 2002 and now includes researchers, technical staff members, and administrators in addition to Crowley:

**Drazen Jukic**, MD, PhD, is an assistant professor of dermatology and pathology and the medical expert on the project.



SlideTutor team, front row, left to right: Elizabeth Legowski, Rebecca Crowley, Eugene Tseytlin; back row, left to right: Velma Payne, Gilan El Saadawi, Olga Medvedeva, Melissa Castine, Lucy Cafeo

**Gilan El Saadawi**, MD, PhD, MS, is an assistant professor of health and community systems and biomedical informatics at the University of Pittsburgh School of Nursing. She is working on human-computer interaction abstraction, evaluation of natural language tutoring, and metacognition.

**Velma Payne**, MS, MBA, DBMI doctoral fellow, measures cognitive biases and determines the relationship of these biases to task stimuli.

**Olga Medvedeva**, MS, MS, is the lead architect for SlideTutor and is responsible for many of its artificial intelligence aspects.

**Elizabeth Legowski** provides expertise in study design and analysis, developing user training programs, and human-computer interaction evaluation.

**Eugene Tseytlin**, MS, developed SlideTutor’s authoring and testing systems and its natural language capabilities.

**Melissa Castine** is the knowledge engineer for the SlideTutor project and author of its domain ontology, and she directs case acquisition and expert image annotation.

**Lucy Cafeo** is the administrative assistant for the Medical Tutor Laboratory.

### Major research areas of the Medical Tutor Laboratory include the following:

**Predicting diagnostic performance:** Multiple-choice tests are generally poor predictors of skilled performance in the real world. A central goal of SlideTutor is to develop formalisms for measuring and predicting diagnostic performance. Future work will focus on aggregating these models to predict student performance in real-world problem solving.

**Measuring and enhancing metacognition:** An often-neglected aspect of expert medical performance is the ability to accurately predict one’s own performance. Ongoing projects are focused on determining what aspects of tutoring lead to overconfidence and underconfidence in self-assessment.

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