

Informatics Today



UNIVERSITY OF PITTSBURGH DEPARTMENT OF BIOMEDICAL INFORMATICS
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Knowledge is Power: Center for Clinical and Translational Informatics Working to Make “Bench to Bedside” a Reality

In the many battles that make up the medical profession’s war on disease, one potent weapon has proved to be both elusive and vast: information.

Despite the wealth of data that researchers have gathered for decades, only a fraction of its potential for analysis has been met, because there has been limited organization of the information—until now.

The University of Pittsburgh’s Department of Biomedical Informatics (DBMI) Center for Clinical and Translational Informatics (CCTI) is one of 12 sites selected to transform clinical research as part of an \$83.5 million National Institutes of Health (NIH) Roadmap grant known as the Clinical and Translational Science Award (CTSA) from the National Center for Research Resources (NCRR). The goal of CTSA is to make the clinical and translational research data repositories interoperable among the 12 centers, as well as to foster data and tool sharing via biomedical informatics, so that researchers across disciplines and across the country can collaborate more effectively on the more efficient development of better treatments and cures.

“What CTSA aims to accomplish is critical to the success of clinical and translational research, particularly clinical trials,” acknowledges Nancy Whelan, director of communications and development for the University of Pittsburgh Department of Biomedical Informatics.

“The type of national scale collaboration CTSA is attempting aims at transforming the institutions, the research, the scientist, the health practice, and the community practice.” Previous attempts like the Cancer Biomedical Informatics Grid (caBIG, see cabig.nci.nih.gov) have provided valuable lessons learned and more importantly a rich community of collaborative informaticists.

In the past, clinical researchers have tended to resist data sharing for several reasons, often stemming from publication issues, tenure track concerns, intellectual property issues, material transfer agreements, or federal regulations mandating new guidelines for patient consent.

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- For more information, please see these Web sites:
- Department of Biomedical Informatics (DBMI)
www.dbmi.pitt.edu
- Center for Clinical and Translational Informatics (CCTI)
www.ctsi.pitt.edu/content.asp?id=1435
- Clinical and Translational Science Award (CTSA)
www.ncrr.nih.gov/clinicaldiscipline.asp

“The type of national scale collaboration CTSA is attempting aims at transforming the institutions, the research, the scientist, the health practice, and the community practice.”

—Nancy Whelan



Michael J. Becich, MD, PhD
Chair, Department of Biomedical
Informatics

Dear Friends and Colleagues,

It is with great pleasure that I provide you with our first Department of Biomedical Informatics (DBMI) newsletter, *Informatics Today*. It's a compilation of stories, events, announcements and resources that I hope you'll find enjoyable and useful.

Perhaps the most important message is our sincere interest in staying in touch with our many colleagues and friends as we continue to build our new department. We will continue

to strive to attain our mission which is to provide:

- national and regional leadership in innovation through research in informatics;
- the highest quality of support for the clinical practice of medicine through regional and nationally recognized leadership in clinical informatics; and
- the highest quality of instruction in informatics.

Our affiliations with the Departments of Medicine and Pathology as well as the University of Pittsburgh Cancer Institute (UPCI) remains strong. Our lessons learned, relationships formed, and services provided have laid the ground work for our current endeavors. These ties will remain strong as we continue to grow and service the broader community. We are particularly excited about new partnerships we are forging with our newly funded Center for Clinical and Translational Informatics, which is part of the prestigious NIH Roadmap Initiative for Clinical and Translational Science Awards (CTSA).

In just a few months our informatics team has come together like never before. We've enlarged our faculty from 14 to 18, our portfolio of grants by 30 percent, and markedly expanded our services. Such success is unprecedented, but we've only just begun. Stay tuned, and remember, our door is always open and my cell phone (412-606-6453) is always on!

Respectfully submitted,

Michael J. Becich, MD, PhD
Chair, Department of Biomedical Informatics
(www.dbmi.pitt.edu)

Overview of the Training Program

The Biomedical Informatics Training Program at the University of Pittsburgh is proud to be celebrating its vicennial anniversary this year. The training program was originally formed in the Section of Medical Informatics in 1987 and has grown significantly since that time. It now is an integral part of the Department of Biomedical Informatics. Its mission is to provide outstanding training for the next generation of leaders in biomedical informatics research, development, and education.

The training program has graduated 82 students in the last 10 years. There are currently 33 graduate students in the program who are pursuing doctoral degrees (20), masters degrees (9), and certificates (4). Eight new trainees will be entering the program in the coming academic year.

The training program provides educational concentrations in clinical informatics, bioinformatics, dental informatics, health services research, and biosurveillance and infectious disease informatics. More than 20 biomedical informatics courses are offered on a wide range of topics that are important to the field.

The 28 core faculty play a central role in the training program by teaching courses, directing trainee research, and serving on key committees. Fifty percent have their primary appointments in DBMI, while other faculty have their primary appointments in computational biology, medicine, dental medicine, computer science, information sciences, health information management, nursing, health and rehabilitation sciences, and radiology. Gregory Cooper serves as the training program director, Wendy Chapman as the associate director, and Michael Becich and Titus Schleyer as codirectors. Toni Porterfield provides excellent support for all aspects of the program as the training program coordinator.

Since 1986, the training program has had training grant support from the National Library of Medicine (NLM), making it one of the oldest NLM-supported programs in the country. This grant was recently renewed for another five-year period. Currently there are 13 NLM supported trainees in the program. Twelve of these trainees will be attending the annual NLM training program meeting, which will be held this year in June at Stanford University.

Additional information about the Biomedical Informatics Training Program is available at www.dbmi.pitt.edu/training-program/index.html or by calling 412-647-7176.

Department Grant Support, Direct and Indirect

July 2006–June 2007 • Total: \$11,600,000

Grant	Faculty Member	Amount
Adaptive Scalable Client Server for Visualization (NIH N01)	V. Monaco	\$8,836
Bayesian Modeling for Biosurveillance (NSF IIS)	G. Cooper	\$530,000
Best Practices QA in Path & Lab Medicine (CDC U10)D.	Grzybicki	\$85,462
Bioinformatics Training Grant (NIH R-T15)	G. Cooper	\$790,541
Biomarkers for Pancreatic Cancer (NIH U01)	M. Becich	\$10,015
Biowatch Support: Integrate & Interpret (Airforce)	M. Wagner	\$1,004,007
Cancer Biomedical Informatics Grid	D. Fridsma	\$228,167
Cancer Biomedical Informatics Grid	M. Becich	\$143,702
Cancer Biomedical Informatics Grid	R. Crowley	\$72,925
Cancer Biomedical Informatics Grid	R. Day	\$64,735
Cancer Biomedical Informatics Grid	V. Monaco	\$29,194
Cancer Center Support Grant (NIH P30)	M. Becich	\$280,364
CDC -Tracking and Disease Surveillance	M. Wagner	\$11,063
Cervical Carotid Imaging With MR	B. Chapman	\$32,409
Clinical & Translational Science Institute (NIH UL1)	M. Becich	\$630,427
Computational Learning in Biological Sequence (NSF EIA)	V. Gopalakrishnan	\$5,001
Detectability Epidemics From Over Counter Sales (NIH R21)	W. Hogan	\$163,136
Dietary Cancer Prevention (NIH P01)	R. Day	\$9,017
Disaster Planning and Management (CDC R01)	G. Wallstrom	\$337,686
Early Warning Public Health Surveillance - PA	M. Wagner	\$368,000
Evaluation of Telepathology (US Army)	D. Grzybicki	\$74,374
Evaluation of Teleradiology (US Army)	D. Grzybicki	\$74,970
Gynecological Disease Program (US Army)	M. Becich	\$490,007
Immune Tolerance Network	D. Fridsma	\$185,625
Improving Detection - Aerosol Attacks (NIH-CDC R01)	W. Hogan	\$579,239
Indianapolis Pathology Informatics Network (NIH U01)	M. Becich	\$169,370
Integration NK & DC (NIH P01)	R. Day	\$15,797
Intelligent Aids for Proteomics (NIH K25)	V. Gopalakrishnan	\$127,449
Intelligent Melanoma Diagnostic Training System (NIH R25)	R. Crowley	\$81,551
Intelligent Microscope Tutor on the Internet (NIH R01)	R. Crowley	\$301,645
Learning Patient Models from Clinical Data (NIH R01)	G. Cooper	\$232,916
Mesothelioma Translational Research (NIH-CDC U19)	M. Becich	\$616,031
Michigan Public Health Access to NRDM	M. Wagner	\$23,810
Mining Complement System for Lupus Biomarkers	D. Fridsma	\$33,309
Multispecial MR Analysis Carcinoma (NIH R21)	B. Chapman	\$84,901
National Retail Data Monitoring	M. Wagner	\$559,000
Neoplasia Risk Assessment in Ulcerative Colitis	R. Day	\$15,114
NLP for Respiratory Surveillance (NIH K22)	W. Chapman	\$162,000
Novel Anticancer Agents (NIH P01)	R. Day	\$5,637
On-Line Test Results (UPMC Health System)	V. Monaco	\$42,993
Pittsburgh Influenza Prevention Project (CDC)	M. Wagner	\$10,399
Proteomics & Bioinformatics Core (US Army)	M. Becich	\$1,894,422
Reading Level Evaluation for E-Health Resources (NIH R21)	V. Monaco	\$191,565
Reducing Errors in Diagnosis of Melanoma (NIH 1 U18)	D. Grzybicki	\$231,521
Serum Proteomic Biomarkers for Colon Cancer (NIH U01)	M. Becich	\$43,628
Somatic Cell Therapy Processing Facility (NIH N01)	M. Becich	\$17,369
CTSA Online Research Community	T. Schleyer	\$132,199
Oral Health Disparities	T. Schleyer	\$10,511
Dental Informatics Training Program sub-account	T. Schleyer	\$8,375
Dental Informatics Online Community	H. Spallek	\$87,566
SPORE in Lung Cancer (NIH 2 P50)	R. Day	\$7,715
Statewide Cancer Clinical Trial Network	V. Monaco	\$30,000
Surveillance System and Water Quality Data (EPA)	M. Wagner	\$50,000
Synthetic Interview	V. Monaco	\$115,579
Telepathology (Army)	B. Chapman	\$16,235
Therapeutic Implications in Cancer (NIH P01)	M. Becich	\$33,190
Tissue Resource for Molecular Classification (NIH U01)	M. Becich	\$50,272

Realtime Outbreak and Disease Surveillance Laboratory

In September 1999, researchers at the University of Pittsburgh began developing the Realtime Outbreak and Disease Surveillance (RODS) system, the first real-time public health surveillance system that collects coded chief complaints from free text and electronic laboratory reporting in real time. The principal developers of the system were Michael Wagner, Fu-Chiang Tsui, and Jeremy Espino. As a result of its success, the RODS Laboratory was founded to explore the use of information technology for the detection of disease outbreaks—both naturally occurring and resulting from bioterrorism.

One of the most nationally recognized developments of the lab's work is the National Retail Data Monitor (NRDM), a public health tool that collects daily sale counts of over-the-counter (OTC) healthcare products from major retail drug and mass merchandise chains. Currently, 13 major retail chains, representing more than 20,000 stores, are providing the NRDM with daily OTC sales counts from 18 different categories of medications. On a daily basis, stores electronically submit counts of products such as cough and cold medicines, electrolytes, thermometers, skin ointments, pediatric medications, and OTC respiratory drugs. More than 800 health department personnel in 48 states use the NRDM to detect disease outbreaks within their jurisdictions by comparing daily sales counts in any given medication category to the previous year's sales counts on the same day.

The laboratory also does basic research in further development of biosurveillance systems. Such research includes, but is not limited to, algorithm development and analyses of other types of data for use in such system. For example:

- The Bayesian Aerosol Release Detector (BARD) detects and characterizes outbreaks of inhalational anthrax due to atmospheric dispersion of *B. anthracis* spores. BARD, developed by William Hogan, analyzes counts of emergency department visits for respiratory complaints from the RODS

system, recent meteorological data, and regional spatial and population information to determine whether current emergency department data are more consistent with usual levels of respiratory disease or with levels associated with an outbreak of inhalational anthrax.

- High-Fidelity Injection Detectability Experiments (HiFIDE) have been developed by Garrick Wallstrom. HiFIDE is freely available software that enables public health officials to analyze the expected detectability characteristics of a surveillance system operating in their jurisdiction on surveillance data that are available for the jurisdiction (specifically, the expected sensitivity, specificity, and timeliness of detection for outbreaks of varying sizes, etiologies, and geographic and demographic scopes).
- Wendy Chapman and John Dowling are continuing their research in NLP (Natural Language Processing), with the goal of encoding free-text data into a form that can be monitored by RODS' detection algorithms for early detection of outbreaks, and to evaluate the usefulness of the encoded data in detecting outbreaks.
- Gregory Cooper is leading a five-year National Science Foundation (NSF)-funded project to investigate Bayesian methods for disease outbreak detection. The project involves a collaboration among investigators at the RODS Laboratory and the Auton Laboratory at Carnegie Mellon University. Primary goals of the project include developing and evaluating multivariate spatio-temporal algorithms for detecting known outbreak diseases of concern (e.g., respiratory *Z* anthrax) and for detecting heretofore-unknown outbreak diseases. Additional information about the project is available at www.dbmi.pitt.edu/panda.
- Under the direction of Wagner and funded by the EPA, a research project to build a prototype system that incorporates and analyzes water quality data and clinical data is nearing completion.

Future issues of *Informatics Today* will report on these research projects as they progress.

The recently published *Handbook of Biosurveillance* (written by Wagner and associates, Elsevier, 2006), is the first comprehensive, unified, multidisciplinary examination of the field of biosurveillance—the systematic process of data collection and analysis for the purposes of detecting and characterizing outbreaks of disease in humans and animals in a timely manner. The book reviews the state-of-the-art practice and research of biosurveillance and covers all facets of the emerging discipline.

For more information on the RODS Laboratory and its distinguished history, as well as information on the RODS system, which is available on open source under GNU license, please visit the RODS Laboratory website at <http://rods.health.pitt.edu/>.



Front Row (Left to Right): Keerthi Kamalapur, Cleat Szczepaniak, Daphne Henry, Jialan Que

Back Row (Left to Right): Jean-Marc Depinay, Ming-Chi Tsai, Fu-Chiang Tsui, Michael Wagner, Aurel Cami, Manoj Ramachandran, Garrick Wallstrom, Hoah-Der Su

Q&A with Ann McKibbon (MED '05)

Q: *What have you been up to since receiving your PhD in biomedical informatics from Pitt?*

A: June 17, 2005, was the day I defended my dissertation; it seems like yesterday, but much has happened since. I returned to my former department (clinical epidemiology and biostatistics) at McMaster University in Hamilton, Ontario, where I am an associate professor applying for grants and doing research. My love is teaching, and I have revamped our overview course in health research methods. I am enjoying teaching it immensely. I am also spearheading a new Master of Science program in health informatics with the business and engineering schools.

Q: *How do you remember your academic experience at Pitt?*

A: I look back at my time at the University of Pittsburgh with great fondness. I value my Pitt experience for four major reasons, which I will list in increasing order of importance. First, the history of biomedical informatics is long, strong, and deep at Pitt, with early important projects such as INTERNIST-I, Quick Medical Reference (QMR), and Medical Archival System (MARS). Second, Pitt is one of few institutions that has multiple major health professional schools; strong information and computer science departments; well-funded, well-run academic libraries; and an established biomedical informatics department all in one walkable location. Plus, many major healthcare facilities, such as the VA hospital and Hillman Cancer Center are only a short bus ride away. Third, the courses in the Department of Biomedical Informatics (DBMI) and other departments were top-notch. Although at the time I complained about the number of courses, the richness and breadth of my learning was outstanding. I took courses in eight other departments as well as all the DBMI courses I could. Earning an A in data structures and the project prize in the decision analysis course with Shyam [Visweswaran] are high on my good memories list.

Q: *What else stays with you from your time at the University?*

A: The people are what I remember and value most. Doug Fridsma and Ellen Detlefsen were stellar; without them, I would not have graduated. I remember project group members; new babies; relationships blossoming and souring; sharing rooms at the American Medical Informatics Association; incredible, mind-expanding teachers; and ever-present and knowledgeable staff. Faculty, staff, and students cared deeply for individuals and the program, and we had fun. Thinking back, I want to say thank you, Pitt, and, even more, thank you, Pitt people.



Ann McKibbon



Christopher Mast

Q&A with Christopher Mast (MED '03)

Q: *What is your current occupation?*

A: I am currently the lead physician analyst and associate physician project director for the Electronic Medical Record (EMR) implementation project at the University of Texas Medical Branch in Galveston. Part of my work is at the strategic planning level, working with key stakeholders to decide which systems we will implement along with where and when. I also work on the medical information policy for the institution, planning what information goes where and in what format. At a more tactical level, I help guide the implementation and optimization of the EMR system in individual inpatient and outpatient clinical areas. I have an appointment in the Department of Family Medicine, where I see patients two half-days each week and also work with medical students and residents.

Q: *How does your training and education serve you in your current occupation?*

A: My training in biomedical informatics from Pitt is invaluable, and I use it every day. Clinicians and healthcare leaders are hungry for practical, high-quality information on breakthroughs and best practices in our field. Expertise in evaluation is a particularly rare commodity. I also find that knowledge of the organizational literature is extremely useful. My research interests include the factors that influence the success of information system adoption and the effects of clinical information system interventions on process and patient outcomes. These are natural extensions of my master's work at Pitt.

Q: *What else is going on in your life?*

A: My wife Kim took some time off to be with our boys but is now planning to head back to work on a part-time basis. Our older son, Samuel, will be 6 years old next month. He loves kindergarten and reading. Our younger son, Benjamin, is 2. He loves music and "big trucks." We love the warm Texas winters but miss the hills and our friends in the 'Burgh.



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There also was no standardized method for collecting data and no vocabulary nor ontology services to act as the “Rosetta Stone” for clinical research. Some clinicians favor Excel spreadsheets; others “off the shelf” databases and some still use paper notebooks. These all raise concerns about compliance with current privacy and confidentiality guidelines for stored patient information.

“Getting everybody literally on the same page through effective communication and alignment of incentives is the answer as a recent retreat of the University of Pittsburgh’s Clinical and Translational Science Institute taught us,” says Whelan, who notes that junior investigators, who are more appreciative of the value of collaboration, are also more comfortable using standardized computer programs. They are also going to need to use the same terminology, common data formats, and address key workflow related issues. Fortunately, this new five-year NIH grant to DBMI to help form CCTI carries a strong incentive to change.

“It’s a fresh, new emphasis being put on what a lot of people have been trying to do already,” says Whelan. “A lot of people have recognized this need, and now we have the opportunity that an NIH Roadmap Initiative like CTSA provides to do something about it.”

Changing the culture of clinical and translational research is the other challenge, but Whelan believes the center is up to the task. While everyone is anxious to publish and get on the fast track to tenure, increasingly, principal investigators understand that collaboration yields more data and can lead to more efficient and higher quality findings with broader impact to the practice of medicine.

“I’m very positive that we will be able to do this work. People are more ready for it,” she says. “Collaborative efforts are being rewarded by the various NIH funding agencies and beyond.” An important advantage that DBMI has is a robust set of critical data de-identification services developed by Melissa Saul and Greg Cooper, vice chair of DBMI. De-identification is critical to compliance with the Health Insurance Portability and Accountability Act (HIPAA) of 1996, which tightened up privacy restrictions in health information. More importantly, the DBMI team has been instrumental in developing “honest broker” software, policy, and procedures for removing barriers to clinical data for use in research. The workflows the CCTI team has developed for CTSA ensure efficient access to information.

In summary, the newly formed Center for Clinical and Translational Informatics in DBMI is an exciting development pulling together the many strengths of our faculty and staff. It leverages funding from multiple resources and will be a cornerstone of our research programs at DBMI in the years to come. We are actively conducting a national search for a leader for this effort and welcome our friends to assist in this effort. Stay posted (and in touch) as we will update you on DBMI’s progress for this important effort in the newsletters and e-mail communications that follow.

If you are interested in receiving a copy of our CCTI grant (or those from other funded sites), please e-mail Nancy Whelan at whelannb@upmc.edu or call her at 412-623-3860.

**Please visit our Web site: www.dbmi.pitt.edu
or call 412-647-7113**