

\$1.5 million Gift from Air Liquide for Inhalation Technology Program

CIMIT is establishing a technology initiative for the development of innovative approaches to inhalation therapy, an ambitious project made possible through a \$1.5 million gift from Air Liquide.



The plan will be developed over three years and its aim is to help reduce both human suffering and health-care costs for those with chronic and acute respiratory conditions. This partnership reflects CIMIT's stature as a trusted force in the development of innovative technology in medicine. CIMIT has relationships with numerous corporations but this seed funding is unique.

Martha Heitzmann, PhD, vice president, Research and Development for Air Liquide, stated, "Air Liquide is pleased to provide the seed money for this CIMIT program. We look forward to working with other industrial and academic partners to advance inhalation technologies."

The inhalation project will stimulate the development of technologies and techniques that allow the use of a pulmonary passage as a "highway."

The inhalation project will stimulate the development of technologies and techniques that will allow the use of a pulmonary passage as a "highway" to deliver therapeutic molecules directly to diseases or irritated tissue. CIMIT will establish an Inhalation Technology Consortium to fund subsequent phases of research and development. CIMIT will also create a plan for disseminating research, and finding and training inhalation technology researchers and practitioners. Also, it will host convening events to highlight the clinical challenges and technological approaches to inhalation therapies and techniques.

"This gift will enable CIMIT to develop a new project directed at respiratory medical conditions that have a high cost to patients and society," said CIMIT Executive Director John Parrish, MD. "We look forward to building a network of innovative leaders in this domain. Ultimately, patients will benefit from better medical care."

CIMIT will manage the initiative, and will recruit a team of program leaders and a high-level Scientific Advisory Council.

Air Liquide, based in France, serves more than 5,000 hospitals and 300,000 homecare patients around the world. The group supplies gases, hygiene products and equipment to hospitals, and inhalation therapy and homecare services to respiratory patients. It employs 40,000 in 75 countries.

"This gift from Air Liquide, a leading international organization, reflects the fact that CIMIT is a world-class leader in medical innovation," said Beverly Brown, PhD, chief development officer at CIMIT. "Our organization looks forward to developing technologies that will benefit patients in all communities." ■

► IN THIS ISSUE

- AIR LIQUIDE
- FEATURE : THE HEALTHCARE 360° KIOSK
- FEATURE : COLLABORATING ON EPILEPSY THERAPY
- IN FOCUS: CIMIT PRIZE FOR PRIMARY CARE
- COMMUNITY: VA BOSTON
- SPOTLIGHT ON INDUSTRY: SENSOR TECHNOLOGY + DEVICES
- INSIGHTS : BY JOHN PARRISH
- GUEST COLUMN : MARTHA MURRAY, MD
- CIMIT NEWS & CALENDAR

FEATURE :

Dr. Ronald Dixon Envisions Connected Care With a Kiosk

Janice Doe, the patient, has chronic illnesses. Dr. Ronald Dixon, the physician, has solutions. But like many patients, she can't easily arrange to travel to his office during her workday.

So Dr. Dixon is pioneering innovative approaches to offer a high level of care without the necessity for her to travel each time she feels the need for a medical consultation.

The Massachusetts General Hospital doctor and his team think that a way to improve access and convenience involves virtual visits, and they are pursuing an initiative called The Healthcare 360° Kiosk project. The kiosk would provide two-way video and audio communications, with vital-signs measurement capability and some basic blood testing.

his research recognizes that the demand for primary care is increasing as baby-boomers age and life expectancies are extended. He has completed a CIMIT-supported pilot study involving 30 patients who came to see their primary care physician for routine follow-up or acute care. In the study, carried out with MGH's Dr. James Stahl, patients agreed to first having a visit via a computer equipped with a Web camera. Dr. Dixon sat in another room to conduct the session, asking questions while patients pointed to which parts of their body were causing discomfort.

visits to friends as a way of saving time. The physicians say that virtual visits like these can never replace care that requires physical examinations, but for some conditions the virtual approach might work just as well. A randomized trial involving more patients and doctors is underway at MGH. The pilot study was reported in the journal *Telemedicine and e-Health*.

Their work recognizes that patients, especially elderly or chronic patients, value the personal relationships they have established with their doctors and nursing teams. Dr. Dixon said, "We predict that given the choice, a patient would rather go to a kiosk or videoconferencing unit and interact with his or her personal care team than go to a retail clinic and meet with a stranger." ■

With the Healthcare 360° Kiosk, it is believed that 30 to 60 percent of current face-to-face visits can be eliminated.

The goal is to record and transmit patient information that the primary-care physicians need to manage the most common ailments, such as hypertension, diabetes, and back pain. By providing such self-service information gathering, it is believed that 30 to 60 percent of the current face-to-face visits can be eliminated. Such a device could be placed in the home, at a senior citizen's center or at connected medical locations; each venue capable of facilitating virtual clinical encounters.

As a general internist and an associate medical director of MGH Beacon Hill,

After patients and the doctor completed questionnaires about the virtual visit, they met face-to-face and went through a second consultation, but with time for a hands-on physical examination. Both visits got high marks. Most patients said they preferred the face-to-face visit, which was expected. But when evaluating the benefits of the Web-based exam, they said they approved of how the time was spent, how well the doctor gave explanations and how competent he appeared.

Fully 26 of the 30 patients said they would recommend videoconference



IN FOCUS:

CIMIT Prize for Primary Healthcare



CIMIT has announced a dynamic new engineering prize competition: the CIMIT Prize for Primary Healthcare. The top three entrants will receive \$150,000, \$100,000 and \$50,000, respectively, to help advance their winning clinically-relevant, primary care solutions.

This national competition is open to graduate and undergraduate engineering students from accredited engineering programs, and is designed to encourage development of technological innovations in the frontlines of care. Contest participants will begin with a letter of intent, putting forward the basic goal of the planned effort. Ten finalists will then be chosen by CIMIT to continue. Each of those ten will be provided with \$10,000 to fund expenses for developing their idea into a full entry. Letters of intent will be due January 15, 2009 and finalists will be named February 9. The ten final proposals will be due May 31, and announcement of the three winners will be made June 30.

This CIMIT Prize is made possible because of a generous \$2.5 million gift from the Gelfand Family Charitable Trust, which will support the competition annually over the next five years.

More information about the CIMIT Prize and entry procedures at www.cimit.org. ■

The CIMIT Prize for Primary Healthcare will provide three awards to engineering students to advance clinically-relevant primary care solutions.

CIMIT COMMUNITY:

VA Boston Healthcare System Joins CIMIT

The VA Boston Healthcare System (VA BHS) has joined the Consortium. Comprised of three campuses and six outpatient locations in the Boston area, the Boston VA Hospital system plays a vital role in caring for health and wellness of this important patient population.

Through its Health Administration branch, the Veterans Administration has a national patient population of 6 million, with about 400,000 Iraq veterans. VA BHS cares for a base of 65,000 patients with about 11,500 inpatient and 600,000 outpatient visits annually. VA BHS has one of the largest Research programs in the VA.

The VA organization is a pioneer in the development and use of electronic medical records. Leaders from both CIMIT and VA BHS say they are expecting exciting collaborations among researchers that could result in

valuable medical breakthroughs for soldiers, veterans, and civilians.

In making the announcement, CIMIT Executive Director John Parrish, MD, said, "We are pleased to welcome VA BHS as part of the CIMIT family. It is a fine medical organization with an excellent research division, and by working with its doctors and researchers we feel that valuable innovation will result and both veteran and civilian patients will benefit."

The addition of VA BHS will enable CIMIT to attract and engage large foundations and companies interested in soldier/veteran medicine. And because of its success in creating the most comprehensive electronic-medical records system in the country, this relationship could enable CIMIT researchers to access and develop valuable data.

The VA is a national leader in medical innovation. Its research played a key role in developing the cardiac pacemaker, the CT scan, the first liver transplant and improvements in artificial limbs. VA clinical trials established the effectiveness of new treatments for tuberculosis, schizophrenia and high blood pressure.

Dr. Michael Charness, Chief of Staff at VA BHS, said, "VA Boston Healthcare System is pleased to become the newest member of CIMIT. The VA has been a national leader in medical informatics and the creation of innovative systems of healthcare. CIMIT will foster valuable collaborations to help VA clinicians and scientists bring their ideas to the bedside." ■

GUEST COLUMN :

CIMIT Has Been Crucial to Research on Improving Treatment of Damaged Knees

By Martha Murray, MD

When I was in graduate school, a close friend tore an ACL and I was surprised it took so long to heal. I was frustrated that there didn't seem to be better medical procedures to get him back on his feet. That memory stayed with me, and today I am a surgeon at Children's Hospital Boston who has chosen knee repair as a specialty.

I see a lot of athletes with injuries in my current practice. Many are young women with bad knees, an injury that can sideline the most energetic players. The knees of high-school girls don't strengthen up as rapidly as those of boys, so much of my work centers around developing better treatment for young female athletes. My research team and I are studying the science of ACL tears, and learning how to improve the treatment of them. Studies show that many who receive orthodox knee surgery often get arthritis in later years, which can result in deterioration and eventually an artificial knee. We'd like to preserve



-mindedness in helping us to start our research. CIMIT has also been helpful in discussing the commercial future of such research, and how we might someday integrate our work into the marketplace.

CIMIT put us in touch with MIT graduate engineering students who have been terrific in helping develop the "hardware," a device that can enter the knee to dispense a gel that stimulates healing of the ACL. Our MIT contributors have been instrumental in designing and building this promising prototype.

As I look back on the early days of this project, a very valuable gift from CIMIT was encouragement. CIMIT gave us a chance when few people were interested, and they helped us work through numerous problems as we moved forward in developing our product. Our (growing) research team feels like we are sprinting toward the future, with confidence that no insurmountable ambulatory problems will slow us down.

Martha Murray, MD, is Assistant Professor in Orthopedic Surgery at Children's Hospital Boston. Dr. Murray's lab studies the regenerative potential of the native tissues after injury. ■

CIMIT put us in touch with MIT graduate engineering students who have been instrumental in designing and building this promising prototype.

the real knees and keep them moving under their own power.

CIMIT leaders have been very supportive of my proposals, which were quite unique at first. With the aid of CIMIT, we are making progress in our research to develop a restorative gel for the ACL, and a device to place it in the knee. Our approach was unusual, but CIMIT said, "It's worth trying," and provided us with grants to get started. Data we developed from the early grants have enabled us to obtain other financial support, but I will always remember CIMIT's open-

SPOTLIGHT ON INDUSTRY:

Collaborating with Northern Ireland Company on Monitoring Device

An ambulance pulls up to a medical center and fast-moving emergency medical technicians deliver a patient to waiting doctors and attendants. The challenge now will be to register the newcomer and provide all therapeutic measures possible. But how do we make sure the patient will be monitored effectively while waiting?

What if there was a wireless device that could monitor vital signs of patients awaiting emergency care? CIMIT is facilitating the development of such a novel device in concert with ST+D of Ulster, Ireland.

Sensor Technology and Devices (ST+D), is a spin-out from the University of Ulster. A new device—*Guardian Aingeal*—leverages ST+D's expertise in developing medical sensors and wireless systems that monitor a patient's vital signs.

An innovator in sensor and electrode components for medical devices, ST+D is a world authority in the design of motion tolerant medical measurements.

Celtic for angel, the *Guardian Aingeal* sensor has the potential to improve care in and around hospital waiting rooms, where patients seeking care in crowded



emergency rooms may wait for hours before receiving attention. Such a device will add a surveillance safety-net to these traditionally "unmonitored" waiting areas of the hospital.

A team of CIMIT investigators, led by Dr. Nat Sims, an internationally recognized developer of medical devices, is working with ST+D to determine how soon they can have a device ready for testing.

IN BRIEF :

CIMIT Welcomes New Site Miners

Site Miners identify promising researchers, facilitate the forming of collaborations and help teams access CIMIT funding.

Martha Murray, MD, is a new Site Miner at Children's Hospital Boston and will work closely with Frank Pigula, MD, who is also a Site Miner for the hospital.

Draper Laboratory has appointed Dale Larson, PhD, as the new Site Miner for that institution. Dale is director of the Biomedical Engineering Program office.

Military Medicine

Steve Dawson, MD, and the SIM Group will be participating in two exhibits on battlefield medicine during November.

Boston's Museum of Science is hosting a November 11 Military Medicine Event where attendees can learn about VIRGIL and other combat training mannequins developed by the SIM Group.

Other simulation training mannequins developed by the CIMIT Simulation team will be displayed during the three month exhibit of *War & Medicine at Wellcome Collection* in London.

The collaboration aims to develop a miniaturized, patient-worn monitor that will provide information on heart rate and rhythm, respiration, temperature and movement. Such a device will use the existing hospital wireless networks to communicate any indication of change even as patients move around the hospital.

Future applications of this device could include: inpatient care, continuous monitoring from admission to discharge for all patients; home and ambulatory care; post-discharge surveillance and chronic-disease management; self-management and family surveillance. This *Guardian Aingel* will go a long way towards monitoring the unmonitored in need—anytime, anywhere.

INSIGHTS :

By John Parrish

Welcome to MIMIT—A Newly Formed Center for Innovation in the UK

CIMIT has crossed the pond! One of this year's most rewarding experiences has been our transatlantic collaboration with the University of Manchester, UK in guiding the creation of CIMIT's first international affiliate.

During our Wellcome Trust/CIMIT Symposium on *The Models of Innovation*, CIMIT was introduced to a high-level group of medical professionals from Manchester who sought to replicate the CIMIT model of innovation in the United Kingdom. And, after hosting several visits from leaders of the various medical centers and universities in the Manchester biomedical engineering cluster, the institute MIMIT was formed.

Manchester: Integrating Medicine and Innovative Technology was created to generate and develop innovations in medical and health technologies.

CIMIT and MIMIT share a passion for collaborative innovation, And in the months and years ahead, we hope to identify opportunities for project specific collaborations between scientists in the UK and here in Boston.

Ultimately, we believe that patients will become the true beneficiaries of our organizational alliance.

We continue to learn the value of our CIMIT network. Our colleagues in the UK were attracted first and foremost to "a dynamic organization committed to innovation and better patient care." Yet it was during their meetings with the clinical innovators and engineers who lead the CIMIT Programs where the true strength of our network revealed itself.

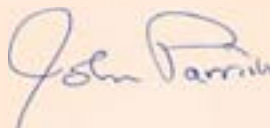
During the course of our exploratory year, we met many UK-based researchers and scientists. All are extremely bright, motivated and committed to developing better care. More importantly, the six medical centers and the University of Manchester offer a fertile environment for collaborative innovation, as this research cluster is focused on finding solutions to many important healthcare challenges.

We are both dedicated to fostering innovation so that patients benefit from better tools, techniques and systems across the continuum of care. Whether that job is accomplished in Manchester or Boston is not nearly as important as the result: that the devices or procedures help those in need.

Based on our very positive experience with MIMIT, CIMIT may explore other international affiliations with like-minded networks that share our commitment to rapidly improving patient care through collaborative medical device technology innovation.

I applaud those at MIMIT for bringing a promising idea to fruition. And I want to convey my thanks to those across the CIMIT network, who contributed insights, resources and personal effort to help make this happen. Today more than ever we believe in the power of collaboration to drive change in healthcare across disciplines, institutions and now geographic borders.

John A. Parrish, Executive Director ■



FEATURE :

CIMIT Creates Climate of Collaboration for Drs. Schachter, Guttag on Epilepsy Therapy

As he stands on a homey outdoor porch, a robust young man suddenly becomes still, and then looks around for refuge. His eyes widen, his body tenses. He clutches the arm of a heavy chair. He is about to have an epileptic seizure, and he hopes that he can get through it without hurting himself or others. Then, friends nearby help him to the floor and eventually his crisis passes.

This emotionally charged situation is captured on a videotape sometimes shown by Steven Schachter, MD, of Beth Israel Deaconess Medical Center. It demonstrates that epilepsy, though contained for some patients by medication, still immobilizes many thousands of others. It is this disabling condition that Dr. Schachter, a doctor, researcher and authority on epilepsy, and colleague John Guttag, PhD, a professor and computer scientist at MIT, are focusing on as they work to discover better methods of treatment.

Much of their story revolves around the partnership itself. CIMIT officials who thought the interests of Dr. Schachter and Dr. Guttag might coincide introduced the two at a CIMIT Forum, the weekly Tuesday afternoon event that brings doctors, scientists and engineers together to network and share information. They began their collaboration when Dr. Schachter, who was developing a treatment using a vagus nerve stimulator implant located under the collarbone, felt Dr. Guttag could be a collaborator who could crunch numbers and interpret data. Once united, the pair put together a grant proposal, and

received CIMIT funding to validate an algorithm Dr. Guttag has developed.

Their research is designed to determine the earliest indications of a seizure, so therapeutic measures can be taken. Progress is measured and deliberate, and Dr. Schachter says it is too early to speak about their initial findings.

Dr. Schachter said, "We hope my work can be successfully connected to Dr. Guttag's innovative testing on identifying the earliest moments of a seizure. If that happens, an effective therapy will be possible where it never was before. CIMIT has helped advance our research and we feel that continued work could benefit many patients."

Their research has great potential for epileptics whose conditions cannot be treated by drugs. And since epilepsy affects close to 50 million worldwide, any improvement has the potential to make a major difference. ■

CIMIT CALENDAR :

Critical Care & Trauma Symposium
November 9-11, 2008

CIMIT Convening Event on Primary Care
December 2, 2008

New Investigator Orientation
December 16, 2008

CIMIT Forum
Tuesdays at 4 pm

For more information on these and other events visit www.cimit.org

FUNDING OPPORTUNITIES :

CIMIT Prize for Primary Healthcare Letters of Intent Jan. 15, 2009

CIMIT Science Grants Feb. 9, 2009

Clinical Systems Innovation Grants Feb. 9, 2009

For more information on these and other funding opportunities visit www.cimit.org

CIMIT CONSORTIUM :

Beth Israel Deaconess Medical Center
Boston Medical Center
Boston University
Brigham and Women's Hospital*
Charles Stark Draper Laboratory*
Children's Hospital Boston
Massachusetts General Hospital*
Massachusetts Institute of Technology*
Newton-Wellesley Hospital
Partners HealthCare
VA Boston Healthcare System

*Founding members

Catalyst is a quarterly publication of CIMIT. To contribute news, story ideas or for subscription information, contact cimitcommunications@partners.org.

*Publisher: Elaine Richardson
Editor: Dyke Hendrickson
Production Artist: Elizabeth Fischer
Contributing Editors: Dawn Querns*