

## **Clinical Research Center**

The Clinical Research Center (CRC) allows investigators to perform cutting edge human research and facilitates human interdisciplinary research. Supported by the National Institutes of Health (NIH), it was established in 1964 to provide a facility in which the Institute's expertise in science and engineering could be applied to the study of human physiology and, possibly, to the development of treatments for human diseases. Effective June 2008, CRC has been under the umbrella of Harvard Catalyst, a consortium of Human Research Laboratories that also includes Beth Israel-Deaconess Medical Center, Brigham and Women's Hospital, Children's Hospital, and Massachusetts General Hospital. The former NIH funded, Harvard-affiliated General Clinical Research Centers all migrated to this organizational and funding structure through a Clinical Translation Science Award (CTSA) to Harvard Medical School. MIT is a direct subcontract to the overall program. MIT's CRC was the first federally supported clinical research center located in a university and not within a hospital, and remains one of only two or three such centers in the United States.

Scientists and physicians authorized to carry out research protocols using CRC facilities include professors and research scientists who work exclusively at MIT and investigators with primary appointments in local medical institutions whose research interests overlap extensively with those of MIT investigators. Research protocols must be approved by the MIT Committee on the Use of Humans as Experimental Subjects, the CRC Scientific Advisory Committee, a biostatistician, and CRC clinical and administrative staff before they can be implemented. Protocol proposals are evaluated for their scientific quality, use of CRC resources, experimental design, ultimate statistical validity, and potential risk to human subjects.

### **Initiatives, Changes, and Accomplishments**

The codirectors coordinated CTSA discussions with Harvard Medical School and MIT's vice president for research to ensure that MIT's CRC was represented as an ambulatory outpatient/outreach center in Harvard's CTSA proposal. These efforts bore fruit when the Harvard CTSA proposal was awarded in May 2008, and MIT transitioned to the new structure over the course of the year. Unfortunately, MIT's grant allotment was dramatically smaller than previous NIH awards, necessitating loss in personnel and a major reduction in available resources. Most of these changes occurred in the final months of 2008, and included the loss of assistant directors, reduction in clinical staff and administrative support, departure of the core laboratory/mass spectrometry staff and the end of those services onsite, and other losses. The year has been highly transitional in nature as CRC charts a new course and refines its focus.

CRC codirectors John Gabrieli, PhD and Ravi Thadhani, MD, MPH have continued outreach efforts to engage MIT faculty and investigators and assist with research and pilot studies, providing infrastructure and resources as needed. Nurse manager Catherine Ricciardi continues to be instrumental in these efforts. Recent and current MIT-based protocols and collaborations include the following:

- Broad Institute: new study with Dr. Vamsi Mootha to diagnose mitochondrial disorders
- Brain and Cognitive Sciences: public school outreach study on dyslexia with professor John Gabrieli
- Brain and Cognitive Sciences: study with Institute Professor Emilio Bizzi and Dr. Lee Schwamm on telerehabilitation to provide motor retraining to stroke patients
- Biology: ongoing protocol with professor Monty Krieger's laboratory and a new study with professor of biology Rudolf Jaenisch of the Whitehead Institute
- Center for Environmental Health Sciences: a protocol with professor Leona Samson to examine biomarkers for inflammatory bowel disease is in the post-enrollment analysis phase and may be expanded
- D Lab: study with senior lecturer Amy Smith to test adherence to drug regimens
- MIT Medical: a study to test physical therapy rehabilitation via a simulator with Dr. Michael Kane
- Architecture: ongoing study collaboration between professor Stephen Intille and CRC bionutritionists
- Media Lab: study to examine trust behavior with professor Ed Boyden

The Metabolic Abnormalities in College Students study has continued, with Ravi Thadhani and Catherine Ricciardi as investigators. An article stemming from their collaboration with the Broad Institute's Professor Mootha and his doctoral student, Oded Shaham, was published in *Molecular Systems Biology* in August, 2008. Research studies in endocrinology under Dr. Steven Grinspoon of Massachusetts General Hospital have continued, as have diabetes studies under Dr. David Nathan. Dr. Amy Fleischman, Dr. David Henderson, Dr. San Wang, and researchers from the Benson-Henry Institute for Mind Body Medicine are among other active collaborators.

The Center for Environmental Health Sciences included CRC in its five-year grant renewal application. The proposal is for CRC to be the human subject research arm, providing support and infrastructure for human subject clinical research pursuits, and providing related education and training.

MIT researchers have recently approached CRC in other areas, including the following:

- H Lab: Innovations in International Health - currently providing clinical consulting in medical technology development to address the needs of resource poor countries
- Media Lab: study proposal to examine the effects of branding on perceived pain control
- Media Lab: study proposal to measure changes in autonomic nervous system in early childhood development with application as an early indicator in developmental disorders such as autism

CRC continues to foster opportunities for MIT undergraduate and graduate students to participate in clinical research projects. CRC staff members strive to provide protocol development consulting to current and new MIT investigators, to help them define or focus their research and connect with the appropriate resources and collaborators.

### **Medical Professionals**

All CRC nurses and all physicians engaged in protocols are credentialed through MIT Medical. In addition to the physicians assigned to each protocol, CRC is an ambulatory care center providing nursing services on an outpatient basis every weekday. In addition, nurses have the ability to provide offsite research support to assist researchers on other parts of the MIT campus. Nursing services at CRC are provided in compliance with the American Nurses Association Standards of Clinical Practice, and all nurses are required to exhibit competency in both clinical practice and research procedures. Each research protocol is assigned a primary nurse coordinator or physician assistant who is responsible for working with the investigator and developing a plan for each protocol's implementation. The primary clinician also serves as a resource for other clinicians and works closely with other team members on the multidisciplinary research team.

The clinical staff is actively engaged in Harvard Catalyst planning and initiatives, and stays abreast of developments in the field. Nurse manager Catherine Ricciardi organized poster sessions and planned a workshop. Her outreach efforts within the MIT community culminated in a collaboration with Kathy Vandiver of MIT's Center for Environmental Health Services to deploy a successful cell biology workshop for Boston area research nurses in January 2009. This introduction to basic cellular processes (necessary for understanding the etiology of human disease and their treatment options) further demonstrates the commitment of CRC to facilitate translational research through education of all members of the research team. This collaboration provided MIT with the opportunity for outreach to Boston area health care professionals, and highlights MIT's unique contribution in translational research and education.

CRC also has a research support associate who assists the medical and bionutrition staff with research protocols and processes specimens for laboratory analysis. Until December 2008, CRC also benefited from a core laboratory director.

Dr. Elaine Shiang from MIT Medical has continued to serve as liaison to CRC for credentialing matters, and also serves on the Scientific Advisory Committee (SAC). CRC developed an electronic format for SAC protocol review, and other reviewers are Dr. Kahne, Dr. Shannon, Dr. Bartels, and Dr. Misra, along with biostatistical review provided by Mark Vangel.

### **Bionutrition Core**

The Bionutrition Core of the MIT CRC provides nutrition-related support to all CRC-approved research protocols. This includes nutritional methodology; protocol design; nutritional product establishment; research diet design; calculation, production, and monitoring; indirect calorimetry; clinical nutritional evaluation and assessment; and nutrition intake quantification and analysis. The bionutrition core also provides dual-energy x-ray absorptiometry (DXA) scanning, analysis, and management. The metabolic

kitchen is not currently providing any research meals, but is still providing research subjects with packaged snacks after their research procedures.

An agreement was signed between MIT and Yale-Griffin Prevention Research Center (a center established through a grant from the Centers for Disease Control) for the CRC bionutrition core to provide its expertise to their “Overall Nutrition Quality Index” research project. The bionutrition team established an automated process to apply information provided on the food labels of food products and import it into a nutrition software system. The value of 50 nutrients and the associated ratios of each food required for ONQI scoring are imputed by the bionutritionists to enable the scoring of each commercial food. The research effort is to support the Yale project to establish, validate, disseminate and apply a measure of overall nutritional quality through a food scoring system that can be applied to foods in supermarkets and restaurants, helping consumers to quickly see the nutritional value of a given food. This agreement went into effect on July 8, 2008, and has been directed by Rita Tsay, CRC’s long-term bionutrition manager.

### **Psychological and Educational Assessment**

In November 2008, a new grant-funded position was added, that of a psychometrician, or research psychoeducational evaluator. This position provides a new dimension to the CRC resources available to investigators. The psychometrician is key to Professor Gabrieli’s school-based study on dyslexia, and is qualified to administer, score and evaluate standardized cognitive and language assessments in children, adolescents, and adults, as well as to train graduate students and research assistants to administer and score selected tests. CRC anticipates new collaborations with clinical investigators seeking to organize and implement research protocols in this field.

### **Future Plans**

CRC is part of the planning process as Harvard Catalyst develops centralized procedures and resources for the use of all centers. These include shared access to a facility that will handle routine laboratory tests at a reduced rate, as well as access to a central core laboratory for assays and other tests. Online processes are being developed for submission, tracking, and resource and scientific review of protocols. MIT will also serve as the community outreach arm of this component of Harvard Catalyst. CRC will be intensifying its outreach to the MIT community, interacting with investigators from a variety of areas in an effort to refine its focus and be of maximum support to MIT’s research mission.

### **Personnel Changes**

Continuing staff included John Gabrieli and Ravi Thadhani (codirectors); Catherine Ricciardi, nurse manager; Ilene Horvitz, research nurse; Mozelle Soule, research physician assistant; Maria (Connie) Pinto, research support associate; Rita Tsay, bionutrition manager; and Helene Cyr, research dietician, with bionutrition team members Insuk Durham and Kim Payson. Newcomers to the bionutrition team were Erin Dubich, Alicia Freed, Georgiana Mitrus, and Kim Perreault. Dana Bresee Keeth, administrative officer, and Cheryl Mottley, administrative assistant, joined CRC in

February and April 2009 respectively. Assistant provost for research administration Ron Hasseltine also provided key support. Dr. Lee Schwamm's role changed to that of an affiliate. CRC said farewell to an unprecedented number of staff members in a single year: Jeff Breu, Lisa Freehafer, Joanna Goggin-Vinig, Ann Kusch (who later returned on a temporary assignment), David Mischoulon, Suzanne Miller, Valerie Patilla, and Linda Stockdale.

**John Gabrieli**

**Codirector**

**Grover Hermann Professor in Health Sciences and Technology and Cognitive Neuroscience**

**Ravi Thadhani**

**Codirector**

**Associate Professor of Medicine, Harvard Medical School**

*More information about the MIT Clinical Research Center can be found at <http://web.mit.edu/crc/www/>.*