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HEALTH PERSPECTIVES

MUHC
MCGILL UNIVERSITY HEALTH CENTRE

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Enabling Recovery

Dr. Nancy Mayo is one of a new breed of researchers at the McGill University Health Centre (MUHC). Not only does she care deeply about the progress her disabled patients make during their stay in hospital, she wants to know what they are eating, doing, thinking and feeling long after they have been discharged.

Although Dr. Mayo's curiosity may sound unusual, this holistic and lifelong approach to care is being taken up by many researchers at the MUHC. They hope that by using science in a new way they can better understand the mechanisms of disability and help disabled people lead richer and healthier lives.

Dr. Mayo is an internationally recognized health policy planner and disability specialist and the head of the Disability Research Project at the Research Institute of the McGill University Health Centre (RI MUHC). The Project was created to unite the diverse investigative teams from around the MUHC whose research directly involves patients suffering from impaired physical, intellectual and emotional function. These teams include specialists in geriatric and childhood disabilities, cancer, neurology and surgery, pain research, palliative care, and bone, muscle and tissue disorders. Under the capacious umbrella of the Disability Research Project, they are pursuing three objectives that will bring drastic improvements to traditional disability research.

The first objective involves identifying the common ground shared by patients with different disabilities. "Research in the past has tended to be disease-specific," says Mayo. "We want to look at disability as a broad category that

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(**Enabling Recovery** *continued from page 1)*
includes a wide spectrum of patients." By applying discoveries about often-studied groups such as people with neurological and musculoskeletal damage to groups not typically covered by disability research, for example, cancer patients and people who are dependant on ventilators, Mayo and her team hope to expand the range of patients who will benefit from their research.

The second objective is to increase the breadth of traditional disability research to include such varied concerns as pain, how patients think about their condition, the role played by emotions, and patients' interactions with family members in their home environment. "We'll look at all these factors separately, but also in combination to understand how their interaction affects the rehabilitative process," Mayo explains.

The third and last objective is to expand the typical treatment-intervention window to include those difficult weeks or months before surgery, when measures can be taken to prepare patients for a better surgical outcome. It also focuses on the chronic phase of disability, when patients are usually left to their own sometimes meagre devices. Traditionally, patients such as stroke victims receive therapy for a short period and then are sent home. "There is increasing scientific evidence that a lot of notions we have about the limits of patient rehabilitation are wrong," Mayo says. "Rehabilitation can be lifelong, and people with disabilities can be helped to improve their quality of life right to the end." Aerobic exercise and computer-assisted speech training are being explored as ways to enhance patients' comfort and ability to function at the various stages of illness and recovery.

Presently, disability researchers are working industriously in buildings spread throughout the MUHC's five sites, doing their utmost to collaborate under the auspices of a project that is essentially a collaborative venture. However, working at scattered locations imposes inevitable limitations. To remedy this problem — and at the same time cure the twin ills of ageing equipment and facilities — the MUHC is planning to build a comprehensive research institute alongside the new hospital at the Glen site. Here, the proximity of the disability researchers and their support staff will foster the interdisciplinary cooperation so central to the Disability Research Project.

Perhaps even more exciting, the new site will contain a number of specialized research suites that will be designed to allow researchers to perform detailed examinations of disabled patients while they execute a range of tasks, from riding a bicycle to using a telephone. Researchers will also conduct muscle, cardiac and neurological tests, driver retraining, motor and endurance tests, and studies in dexterity and speech pathology. Although researchers do many of these tests now, they are episodic and often carried out in isolation. As such, they are rarely supported by the infrastructure and follow-up mechanisms that could bring better results. The suites will be contained within the larger Centre for Innovative Medicine (CIM), a facility being planned for the Glen site that will house volunteer patients while they participate in controlled experimental trials. Because patients at the CIM will be able to stay for extended periods if a trial demands it, every stage of a patient's rehabilitation can be closely monitored.

Mayo is convinced that consolidating these tests will be invaluable. "A big part of the research we'll do at the new site will involve looking at images of the brain while patients perform basic tasks," she explains. "For example, while a therapist conducts certain movements with a patient who has just suffered a stroke, brain-imaging specialists will measure the reactions caused in the brain by these movements. Both sets of scientists will then bring their interdisciplinary knowledge to the results to see how things can be improved for the patient."

Another advantage of having the Project operate on one site is what Mayo calls "lifespan research," meaning the ability to study disabled patients of all ages. Conventionally, adult and childhood disabilities are viewed separately, which is reflected in the physical layout of the MUHC. Pediatric researchers are based at the Montreal Children's Hospital site, while their colleagues in adult and geriatric medicine can be found blocks away and up a steep hill at the General site, and even further afield at the Montreal Neurological Institute and the Royal Victoria site. At the Glen, a single research institute will serve both adult and pediatric researchers. Children will be lodged and treated separately, but their health professionals will have much greater access to colleagues working on similar conditions in adults.

Pediatric neurologist Dr. Michael Shevell and occupational therapist Dr. Annette Majnemer will use the CIM, along with other facilities in the new institute, to identify risk factors for neurological damage in children. At the same time they will investigate strategies and interventions that will improve the health, function and well being of disabled children and their families. They describe their work in terms of causes, consequences and care: understanding the origins of disability, studying all possible physical, psychosocial and environmental effects of disability on a child's life, and bettering health care delivery for disabled children.

Along with an interdisciplinary group of investigators from the Childhood Disability Research Centre, Shevell and Majnemer will be grateful for a pediatric research- dedicated magnetic resonance imaging machine, or MRI, that will be available at the Glen. Presently, brain imaging resources are in limited supply, particularly at the Montreal Children's Hospital site. The new facility at the

> "We want to develop the science that will move patients from disability to activity, not just for the short term, but for life."
>
> **Dr. Nancy Mayo, head of the Disability Research Project at the Research Institute of the McGill University Health Centre (RI MUHC)**

MUHC HEALTH PERSPECTIVES

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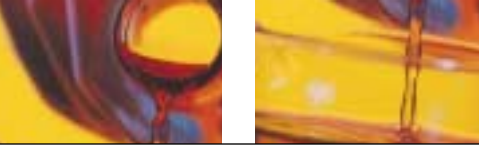


Glen will not only allow researchers to test a greater number of patients, it will make it easier for them to share their results with colleagues whose research overlaps with their own.

Shevell and Majnemer also emphasize the advantages of sharing space with colleagues from across the MUHC. "The new institute will facilitate the link between the work done on adults at the Neuro and what we're currently doing with newborns, infants, children and youth," says Shevell. "With everything consolidated in one place, interdisciplinary co-operation can only increase."

Along with Mayo, Shevell and Majnemer, the Disability Research Project involves researchers studying geriatric disability, pain, surgical recovery, brain imaging, musculoskeletal disorders and palliative care, all areas that will gain from the collaborative ambience and specialized facilities of the new institute. For Dr. Franco Carli, who heads the surgical recovery group, the CIM will be an ideal place to study whether pre-surgical interventions, such as special diets and exercise regimes, can improve a patient's rehabilitation after surgery. Dr. Robin Cohen and the palliative care group plan to house patients in the CIM with the aim of uncovering care-giving strategies that will increase their comfort in their final days. In both cases, the controlled environment of the CIM will allow such variables as diet, exercise and drug interaction to be modified with much more precision than they would be in an outpatient setting.

Dr. Richard Kremer is a respected bone specialist who also heads the musculoskeletal research group. Like Shevell and Majnemer, he will capitalize on the new site's up-to-date imaging equipment to better understand the physiology of diseased bone and muscle. The presence of an on-site biopsy suite will allow unique explorations of the genetics of musculoskeletal disease through the analysis of bone, cartilage, muscle and body fluid. Eventually, this could lead to the establishment of a muscle and bone bank, which, like the tumour banks cancer researchers rely on, would prove an invaluable resource for future musculoskeletal specialists.

For geriatrics specialist Dr. Allen Huang, the new research facility will allow elderly patients suffering from diverse ailments like stroke, arthritis and diabetes to be brought together in order to establish common rehabilitation strategies. Older patients often find it hard to describe their condition, so the in-patient facilities of the CIM will be particularly helpful to Huang, who will be able to identify symptoms by observing his patients over time.

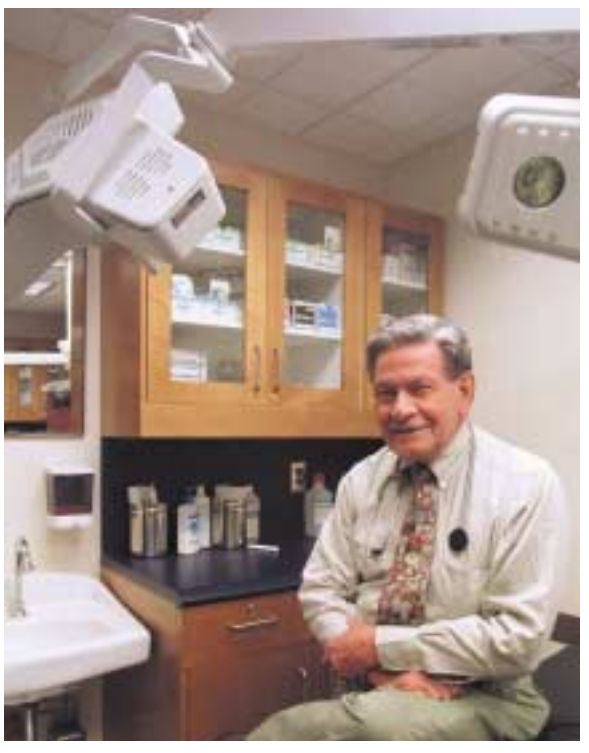
Finally, in a project that intersects with many of the others described above, cognitive neuroscientist Dr. Tomas Paus is exploring the possibility of a link between brain stimulation and brain rehabilitation in disabled patients. In an integrated research facility, Paus will be thrilled to have access to all the patient populations being studied by his colleagues. Such access will allow him to discover whether brain abnormalities are shared across disabled populations.

For patients with disabilities, whether large or small, the scientific advances made by Mayo and her colleagues will only matter if they offer tangible hope for a better quality of life, a goal that is never forgotten by the MUHC's disability researchers. "We're striving for overall long-term success," says Mayo. "The CIM will allow us to conduct the observations and experimental tests required across several disciplines to evaluate performance in disabled patients. We want to develop the science that will move patients from disability to activity, not just for the short term, but for life." ❇

Portraits in Time

Thousands of individuals have helped advance the development of the McGill University Health Centre, and in every issue of *MUHC Health Perspectives*, we feature one or more of these significant contributors.

DR. DOUG KINNEAR



In 1945, officials at Quebec High School in Quebec City gave Douglas Kinnear the school's W.Q. Stobo Award for the Student Best Exemplifying the Qualities of Scholar, Athlete & Gentleman. What they didn't know at the time was that this remarkable award would set the tone for Kinnear's 50-year career in medicine, one that would be filled with excitement, fame and exceptional contributions and honours.

As a young physician Kinnear became well known throughout the sports world for his work with some of Canada's finest athletes. In 1962, ten years after graduating from McGill University's Faculty of Medicine, he accepted the position of Medical Director for the Montreal Canadiens hockey team, which he held until 1999. During his 37 years with the Canadiens he made numerous appearances in newspapers and on television, perhaps more than any other Montreal doctor. He also served as Team Physician for Team Canada at the 1976, 1981 and 1986 Canada Cup tournaments, and also as physician for the Montreal Alouettes Football Club from 1972 to 1976.

More important than Kinnear's work with athletes are his contributions to the medical and academic milieus. In 1962, he founded the Division of Gastroenterology at the Montreal General Hospital. During his 26 years there as a director and attending physician, the division flourished, and its graduates have gone on to assume leading roles in the practice of gastroenterology throughout North America.

He was also a founding member of the Canadian Association of Gastroenterology Appointments in 1961, and 32 years later, the association honoured him with its Distinguished Service Award. He served as Associate Dean of Admissions for the Faculty of Medicine at McGill from 1967 to 1972 and chaired the University's Training Committee in Gastroenterology for many years. He also served as Chief Examiner for the Royal College of Physicians of Canada in both internal medicine and gastroenterology.

Throughout his career Kinnear was an energetic and dedicated professor who was dear to the hundreds of medical students he taught at McGill University. In 1999, the Douglas G. Kinnear Chair in Gastroenterology was created and endowed by patients and friends at the University's Faculty of Medicine. That same year he received the newly established Dr. Douglas G. Kinnear Best Teacher Award from the Department of Medicine at the MUHC's Montreal General Hospital site, where he can still be seen on occasion, teaching with his characteristic warmth and enthusiasm. ❇

Image courtesy of The Gazette, Montreal

Innovation
Gets off the Ground

The Centre for Innovative Medicine is at the heart of a brand-new research facility to be built at the Glen site

What does it take to construct a world-class medical research facility? If your answer included concrete, steel, glass and some very large bulldozers, you'd only be envisioning a small part of what will go into building a new research complex for the Research Institute of the McGill University Health Centre (RI MUHC) at the Glen site. Much more important than construction equipment and building materials is the expertise of the over 2,000 skilled research professionals who will pose questions and search for answers within the facility's walls. Their dedication to improving the welfare of patients through scientific discovery makes even the largest bulldozer seem small by comparison.

At the heart of the new facility, promising to significantly enhance the functioning of the RI MUHC, will be the Centre for Innovative Medicine (CIM). As its evocative name suggests, the CIM will propel the Research Institute into the future with its modern workspaces, cutting-edge equipment and emphasis on physical and intellectual collaboration. While researchers at the RI MUHC already make every effort to improve their results through co-operative ventures, the fact that they work in various locations spread over five hospital sites sets unavoidable limitations.

The new institute will erase these limitations, and the hallmark of the CIM will be interdisciplinary collaboration. Resources will be shared and doctors and their patients will be just a few steps away from scientists working in their laboratories. The largest facility of its kind in Canada, where discoveries made in-house will be tested on carefully recruited volunteers, the CIM will allow MUHC researchers across several departments to continue their work at the forefront of international medical research.

A volunteer patient who enters the CIM will be greeted at the reception desk and will then go to one of several comfortable interview rooms to meet a researcher and answer preliminary questions. The patient will then be shown to one of 40 beds, where he or she will stay for the duration of the study. The CIM can accommodate 12 adult live-in patients, four pediatric patients, eight participants in infectious disease trials (these beds are specially contained), and 16 patients involved in day trials.

During the study, the patient will travel a short distance from his or her bed to one of eight specialized research suites (*see sidebar*). Here, investigators will conduct tests in an open, modern and comfortable environment. A human performance suite for disability research, a minimally-invasive operating room and a pain research suite are just some of the components planned for this area.

For researchers, the patient beds and research suites are only part of how the CIM will make their jobs easier and more productive. Although clinical studies are the backbone of medical research, laboratory experiments are also crucial. Often, either before or after patient testing, experiments must be conducted under the microscope or in the petri dish. For this reason, the suites are complimented by eight research cores where genetic, cellular, biochemical and statistical research can be performed (*see sidebar*). To facilitate close relationships between clinicians testing patients in the suites and scientists working in the cores, a large meeting room will be set up between the two areas where an ongoing research dialogue can take place.

Doctors Morag Park and Guy Rouleau are two of the more than 500 researchers who will benefit from the Centre for Innovative Medicine.

Of course, the objective of this dialogue is to discover new treatments and drug therapies to improve the health of patients. Once these therapies are ready for testing, researchers will be only a few steps away from the CIM's Good Manufacturing Practices Lab, where small quantities of experimental drugs can be made to their precise specifications. Once these drugs are ready, volunteer patients will again be enlisted for multi-stage clinical trials that will ultimately result in the approval of new treatments for a whole host of illnesses.

MUHC researchers are delighted with the opportunities the CIM will present. Dr. Guy Rouleau and Dr. Pierre Drapeau, neuroscientists who will direct the RI MUHC Centre for Brain Disease, plan to use the facility to develop a new field of research called neuromics. Combining research into the genetic abnormalities that cause

brain disease (a field called genomics) with tests to determine how these abnormalities manifest themselves as symptoms (an area of research called physiomics) neuromics promises to provide much more specific information about the genetic mechanisms behind brain disease .

At the CIM, neuromics will be carried out in two stages. Rouleau's team will head the first stage, which focuses on genomics. Making use of the facility's beds, they will test 1,000 patients for mutations in any of the 150 genes currently thought to be linked with such brain disorders as epilepsy and Tourette's syndrome. Once the mutations are found, the genetic information will be passed on to Drapeau's team, which will conduct the second stage of the research. Drapeau and his colleagues have developed a series of efficient tests to determine which mutations are benign and which cause the irregular electrical impulses that may be responsible for several devastating neurological diseases. The disease-causing genes are then logged. Finally, researchers will conduct trials at the facility involving new drugs or treatments that were developed as a result of the research.

Like Rouleau and Drapeau, Dr. Morag Park and the RI MUHC's Cancer Signature Group believe that focused genetic research is the key to understanding the origins and development of disease. Park and her team are working to identify genetic "signatures" that predispose patients to different types of cancer. Although technologies to identify these signatures have undergone a revolution in recent years, oncology researchers still struggle to translate their discoveries into meaningful insights for drug development and patient treatment. At the CIM, Park's team will be able to perform genetic analysis, animal testing and clinical trials in one location, eliminating some of the bottlenecks that have hindered work in the past.

Park's research will begin with advanced genetic screening, where hundreds of genes will be tested for their effects on cancer development. This testing will take place in three of the CIM's research cores: genomics, molecular pathology and gene expression. To synthesize the resulting data, experts from the bioinformatics core will be enlisted to generate three-dimensional computer models. They will also help develop a comprehensive computer network that will log and link every piece of information gathered by the RI MUHC's cancer researchers. Once the relevant genes have been identified, Park and her colleagues will work with CIM pathologists to conduct more tests on animals and banked human tumour samples. A return to the lab will yield further refinements, and so on, until researchers are ready to test new diagnostic tools, treatments and drug therapies on CIM patients.

As these examples demonstrate, it is impressive how many different kinds of CIM researchers will be involved in a single research project. They include the frontline doctors who will be responsible for interviewing and testing volunteer patients, basic scientists who will spend untold hours in their labs analyzing tissue, microbes and genetic variations, experts in nanoimaging and bioinformatics, and staff to design and conduct the clinical trials once a potential treatment has been identified. Because they will all be working under one roof, these specialists will be able to exchange information more easily, allowing them to move more quickly from one stage of research to the next.

The marvel of the CIM is that it will have the potential to encompass a complete research trajectory, from exploring an initial idea to undertaking full-scale clinical trials of a new drug. Furthermore,

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The Centre for Innovative Medicine will be the largest clinical research facility in Canada. Here's what it will contain:

40 Patient Beds:
12 adult live-in beds
Four pediatric beds
Eight infectious disease beds
16 day beds

Eight Specialized Research Suites:
Human Performance
Real Time Quality of Care
Lymphedema
Pain Research
Minimally-Invasive Operating Room
Pulmunary Physiology and Allergen Challenges
Endoscopy
Fluoroscopy

Eight Research Cores:
Tissue Procurement, Histology and Molecular Pathology
Cell Isolation, Identification and Manipulation
Nanoimaging
Bioarrays, Gene Expression and Proteomics
Genotyping, Sequencing, Mutation Detection and Pharmacogenetics
Biochemical Pharmacology and Toxicology
Trial Design, Statistics and Epidemiology
Bioinformatics

Good Manufacturing Practices Lab

Reception, Support, Interview and Meeting Rooms

Equipping Excellence

For patients suffering from inoperable brain tumours, one of the most painful aspects of their condition doesn't come from the disease itself, but from radiosurgery, a common treatment following diagnosis. In radiosurgery, a linear accelerator sends a beam of radiation directly to the site of the tumour. But before this can happen, a metal device called a stereotactic frame is bolted to the patient's skull to immobilize the head. The patient must wear this awkward and uncomfortable frame for the duration of the treatment.

Image courtesy of Accuray

Now, thanks to a recently developed device called a **CyberKnife**, the stereotactic frame may become a thing of the past. Using the body's own skeletal structure as a reference, the highly mobile CyberKnife rotates around the patient's body on an articulated metal arm, targeting the tumour with flexibility and precision. Furthermore, thanks to state-of-the-art software, it can adjust to any movement the patient makes, eliminating the need for an immobilizing frame and ensuring that only the tumour, and not healthy tissue, is irradiated. Even more exciting, the CyberKnife's structure means it isn't limited to the treatment of brain tumours. Unlike current radiosurgery equipment, the CyberKnife can reach tumours of the prostate, lungs and spine, as well as those originating in other organs. With this valuable new tool, oncologists can treat more patients more quickly than ever before, and researchers will have much-needed help in their quest to develop more effective cancer therapies.

At the moment, CyberKnife treatment is available at prestigious medical centres in Europe and the United States, but not in Canada. Researchers at the MUHC have applied for a Canada Foundation for Innovation grant and are working with the MUHC Foundation to raise the funds needed to purchase Canada's first CyberKnife, ensuring that the MUHC remains at the forefront of cancer treatment. A CyberKnife costs over $7 million, but for patients who will be freed from the pain of wearing a stereotactic frame, it's priceless. ❊

This series is intended to be informative; the McGill University Health Centre Foundation does not endorse any particular manufacturer or model of the equipment shown and described here.


Hole-in-One

When professional golfer John Daly sent his ball soaring toward the first green, the crowd at the Cedars 25th Annual Golf Tournament burst into spontaneous applause. Their enthusiasm wasn't just for a great shot, but for a truly historic event that combined friendly competition, an elegant multicultural evening gala and, most importantly, the compassionate philanthropic spirit that has animated the Cedars Golf Tournament since its inception in 1979. This year's event raised more than $1.1 million for cancer research at the McGill University Health Centre (MUHC); a number that exceeded expectations and doubled what was raised at last year's tournament. The MUHC Foundation is proud to have played a role in this tremendous success by actively recruiting foursomes and event sponsors.

John Daly takes a few warm-up shots.

The impressive sum raised at this year's tournament, held on July 7 at the Elm Ridge Country Club on Ile-Bizard, will be placed into the newly-established Cedars Edward J. Tabah Oncology Fund of the MUHC. The fund will allow the Cedars Cancer Institute to expand the range of activities it supports at the MUHC, including the renovation of the gynecologic oncology ward at the Women's Pavilion, a contribution towards a PET scanner (in partnership with the Saku Koivu Foundation), the recruitment of a world-class oncologist as Director of the MUHC Comprehensive Cancer Centre, the expansion and renovation of the newly-named Cedars Cancer Registry of the MUHC, and many other worthy projects.

As he has every year for the last quarter-century, Jim Hindley, along with his co-chairman for the last ten years, Mark Kaneb, strived to make the 2003 Cedars tournament an event to remember. From modest beginnings, the Cedars Golf Tournament has grown into one of the country's most prestigious and successful charity sporting events.

This year, in honour of the tournament's silver anniversary, Hindley and Kaneb, along with their dedicated organizing committee, planned an event that was larger and grander than any in Cedars's history. Two tee-offs, one in the morning and one in the afternoon, allowed more than 500 golfers to participate. In the evening, award presentations were only the beginning of an incredible night of entertainment featuring a wide range of international performers. Of course, the high point of the gala was the announcement of the tournament's million-dollar success, and the knowledge that the partnership between the Cedars Cancer Institute and the MUHC is stronger than ever. ❊

Luxury cars added to the festive atmosphere on the course.

Irish dancers kicked up their heels as part of the evening's entertainment.

(**Innovation** *continued from page 5)*

testing therapies in-house on patient volunteers in close proximity to the labs where the treatments were initially conceived promises to reduce the time it takes MUHC researchers to turn their hypotheses into concrete improvements in care. The CIM will be the largest academic clinical research centre in Canada, and as a result RI MUHC researchers will be well placed to form partnerships with members of the pharmaceutical industry. They will have the chance to use their expertise not only in the initial stages of research, but in the final stages, when new treatments are approved for use by physicians. For researchers, this is incredibly exciting.

But it isn't the only excitement the future promises. RI MUHC researchers are also enthusiastic about the opportunity they will have to help train the next generation of medical researchers. The new institute will undoubtedly entice many of the best medical students in the country, who will be drawn by the chance to simultaneously learn the fundamentals of research and the protocols for clinical trials. Students and researchers will also benefit from collaborations that are already being forged between the RI MUHC and other prestigious clinical research centres in Canada and the United States, including those at Stanford University in California and Mount Sinai Hospital in New York. At present, the RI MUHC trains about 450 students each year. Given the attractions of the new facility, they expect that number to double over the next five years.

Ultimately, all of the sophisticated equipment and advanced research protocols of the CIM will serve one simple purpose: to improve the diagnosis and treatment of patients. In the new research complex at the Glen site, the MUHC's researchers will have many more of the tools they need to achieve that goal. ❊