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Mayo Clinic Creates Healthy Aging and Independent Living Lab

The Mayo Clinic Center for Innovation is collaborating with Mayo Clinic's Robert and Arlene Kogod Center on Aging and the Charter House, a continuing care retirement community in Rochester, Minnesota, in creating the Healthy Aging and Independent Living (HAIL) Lab to support "aging in place"—helping seniors remain at home, healthy and independent. The HAIL Lab will be a place for focus groups, as well as for designing, prototyping, and piloting new services and technologies, with voluntary participation from Charter House residents and other community agencies.

"Physical Medicine and Rehabilitation is the discipline that centers on restoring and improving physical function," says Mayo Clinic researcher Nathan K. LeBrasseur, PhD, who holds joint appointments in the Departments of Physical Medicine and Rehabilitation and Physiology and Biomedical Engineering. "Functional decline is a major threat to independence and aging in place, and thus, PM&R staff at Mayo Clinic are keen to participate in the research efforts and mission of HAIL."

The HAIL Lab will be supported by a consortium of organizations that

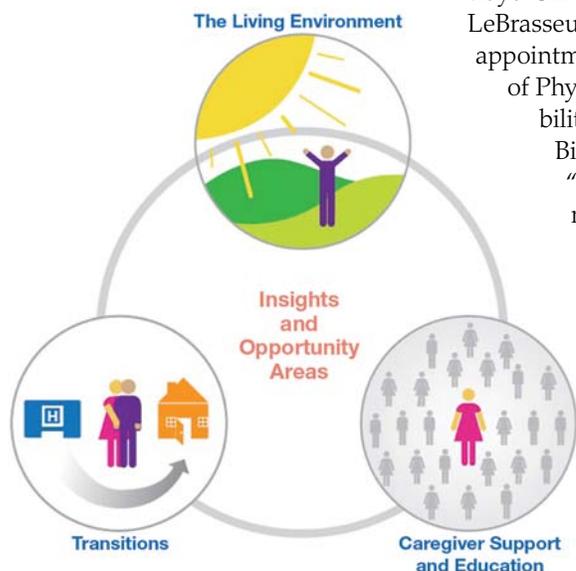


Figure. HAIL is a unique living laboratory embedded within a continuous care retirement community to experiment with opportunities to promote independence and healthy aging. At present, work in the HAIL lab is centered on 3 experimental zones: the living environment, transitions between dependent and independent environments, and caregiver support and education.

Did You Know?

Facts About Spinal Cord Injury Care at Mayo Clinic

Facts and Figures

In addition to caring for traumatic spinal cord injury patients, Mayo Clinic has one of the largest nontraumatic spinal cord injury inpatient programs, with an annual patient volume that ranges from 110 to 135 patients. Our inpatient practice earned a 5-star patient satisfaction award in 2010 and posted a patient mortality index (about 0.5%) that is well below expected levels.

Clinical Highlights

Accredited by the Commission on Accreditation of Rehabilitation Facilities for more than 20 years, we offer comprehensive, patient- and family-centered care to children and adults, including acute inpatient rehabilitation, comprehensive outpatient programs, and lifelong care. Services and therapies include a diaphragmatic pacing system; robot-assisted walking therapy and body weight-supported gait training; biofeedback; upper extremity tendon transfers for tetraplegia; an assistive technology program with defined competencies; and rehabilitation and prosthetic care for patients undergoing hemipelvectomy and other amputations.

Education

We have outstanding patient education materials and support from Mayo Clinic's Section of Patient Education. Publications include *Mayo Clinic Guide to Living With a Spinal Cord Injury*. We also provide innovative professional education programs for physicians and therapists, including Web-based examination training for residents.

Research

We have a strong track record of participation in multi-center spinal cord injury studies, including the Spinal Cord Independence Measure (SCIM) US validation study, the International Non-Traumatic Spinal Cord Injury Program outcome studies, and the International Hydrophilic Intermittent Catheterization study. Ongoing research areas in collaboration with the Department of Neurology include animal studies and development of biotechnology that supports nerve regeneration in the spinal cord system.

Please see the next issue of *PM&R Update* for more information about spinal cord injury care, education, and research at Mayo Clinic.



Nathan K. LeBrasseur, PhD

provide strategy, expertise, and financial support. “The goal of the HAIL Lab is to understand the needs of seniors and to develop products and services that will help them live longer, more independent lives,” says Nicholas F. LaRusso, MD, medical director of the Mayo Clinic Center for Innovation.

HAIL is a unique living laboratory embedded within a continuous care retirement community to experiment with opportunities to promote independence and healthy aging. The lab is located in the Charter House, a residence of more than 300 older individuals, and occupies 4,300 square feet of space that includes 4 separate apartments. At present, work in the HAIL lab is centered on 3 experimental zones (Figure on page 1).

The Living Environment

Aging populations need an environment that promotes health and safety and sustains independence. In this zone, Mayo researchers will explore the use of technology in aging environ-

ments (eg, remote physiologic monitoring) and study risks in the living environment in order to identify services that improve daily life.

Transitions

Transitions between dependent and independent environments require careful preparation and planning for both patient and caregiver. In this zone, Mayo researchers will investigate assessment tools to determine who is able to transition and who is at high risk and create and pilot services that respond to the anticipated needs during transition.

Caregiver Support and Education

Caregivers need education about caring for their loved one and for themselves. In this zone, Mayo researchers will explore different learning styles and levels of caregiver support. They will also work to understand how observation and learning by doing are effective methods of learning and investigate caregiver support around patients with conditions that are common in the aging population.



Nicholas F. LaRusso, MD

New Research Facility Focuses on Muscle Performance and Physical Function

The Muscle Performance and Physical Function Core (MPPFC) is a newly established research facility within Mayo Clinic’s Center for Translational Science Activities (CTSA). Developed in partnership with the Mayo Clinic Robert and Arlene Kogod Center on Aging and the Department of Physical Medicine and Rehabilitation, the mission of the MPPFC is to provide the necessary expertise and infrastructure to perform valid and reliable measures of muscle performance, physical function, and mobility for a broad array of clinical research studies associated with the CTSA and conducted at Mayo Clinic in Rochester, Minnesota.

The specific aims of the MPPFC are 3-fold:

1. Quantify Human Performance. The core will objectively and reliably measure fundamental aspects of human performance in conditions of health, aging, and disease. Specifically, the core will use state-of-the-art technologies and proven methods to quantify 1) skeletal muscle performance, 2) physical function and mobility, and 3) habitual physical activity. These services can be conducted in the core laboratory, outpatient clinics, hospitals, and community.
2. Innovate. The core will provide a focal point for interdisciplinary collaboration (physical medicine and rehabilitation, physical and occupational therapy, physiology, CTSA), in the development, evaluation, and application of new and existing instruments to assess muscle impairments,

functional limitations, and disability in humans. Additionally, the core will establish collaboration with colleagues in the basic sciences to foster translational research and contribute to the design and execution of such measures in preclinical models.

3. Educate. The core will implement and maintain personnel training and certification for the application of standardized muscle performance and physical function testing protocols and disseminate knowledge gained to applicable clinical departments.

“Rehabilitation professionals have long appreciated the importance of optimizing physical function and mobility in the face of aging and disease,” explains MPPFC director Nathan K. LeBrasseur, PhD, from Mayo Clinic’s Departments of Physical Medicine and Rehabilitation and Physiology and Biomedical Engineering. “More recently, other disciplines have also adopted functional outcome measures, such as an individual’s ability to walk, climb stairs, and lift objects, as key determinants of health, independence, and quality of life. We have developed a core facility to objectively quantify these parameters, in part, to understand both the impact of a disease or an intervention on the structure or function of an organ and how the disease or intervention affects the individual.”

In partnership with Mayo Clinic endocrinologist Sundeep Khosla, MD, the MPPFC

is currently studying longitudinal changes in strength and mobility and how they relate to parameters of bone health in postmenopausal women. The core has also initiated a project in partnership with the Kogod Center on Aging and investigators in Mayo Clinic's Department of Anesthesiology to investigate how strength and physical function prior to surgery predict perioperative outcomes such as length of stay, infection, and delirium in older individuals.

The MPPFC helps Mayo investigators examining the impact or association of traits (eg, genetic variation, clinical characteristics, diseases, behaviors) and interventions (eg, drugs, devices, therapies, procedures, behavior modifications) on clinically meaningful metrics of healthspan. Measures of muscle performance and physical function have been selected for their stand-alone importance and established relationships

with falls, frailty, disability, institutionalization, quality of life, and even death. To foster translational research, Dr LeBrasseur and the Kogod Center on Aging have developed the Healthspan Assessment Laboratory to execute comparable outcomes in preclinical models.

The MPPFC has also developed alliances with the Mayo Survey Research Center, the Energy Balance Facility, the Body Composition/Bone Density Facility, the Imaging Core, the Proteomics Research Center, and the Metabolomics Core to enable comprehensive assessments of health span.

"Interdisciplinary collaboration is critical for the success of any research program," says Dr LeBrasseur. "This is a truth that Mayo Clinic and its CTSA have pioneered and strongly endorse. We are confident the unique expertise and resources of the MPPFC will benefit a great number of initiatives to improve health."

New Healthspan Assessment Laboratory

Assessing Clinically Relevant Measures of Health and Aging to Assist Translational Research in Rehabilitative Medicine

Mayo Clinic's Healthspan Assessment Laboratory is a newly established translational research facility in the Robert and Arlene Kogod Center on Aging designed to assess clinically relevant measures of health and aging in laboratory mice to accelerate bench-to-bedside and bedside-to-bench research translation. The lab involves a multidisciplinary team from several centers and departments within Mayo Clinic, including the Department of Physical Medicine and Rehabilitation.

The laboratory includes 3 dedicated rooms with appropriate temperature, ventilation, and light controls. It provides a diverse body of investigators the ability to conduct cross-sectional and longitudinal studies of chronological aging, accelerated aging, and age-associated diseases and the impact of interventions, including drugs, genetic alterations, cells, exercise, diet, and devices, on healthspan.

State-of-the-art equipment includes

- An EchoMRI-100 body composition analyzer (Echo Medical Systems, Houston, Texas) for high-throughput (90 s/scan), noninvasive (no anesthesia required) determination of lean mass, fat mass, and free and total body water
- A 16-chamber Comprehensive Laboratory Animal Monitoring System (CLAMS; Columbus Instruments, Columbus, Ohio) for measurement of respiratory exchange ratio and energy expenditure and simultaneous quantification of habitual physical activity and food intake (Figure)



Figure. The Healthspan Assessment Laboratory includes a 16-chamber Comprehensive Laboratory Animal Monitoring System (CLAMS) for measurement of respiratory exchange ratio and energy expenditure and simultaneous quantification of habitual physical activity and food intake.

- A 6-lane treadmill for assessing exercise capacity and conducting exercise training interventions (Columbus Instruments)
- A computer-integrated grip meter for quantification of muscle strength (Columbus Instruments)
- Protocols and instrumentation for measurement of glucose tolerance and insulin sensitivity
- A stone 14-unit T-maze for assessing the neurobiology of age-associated cognitive impairment (Med Associates, Inc, St. Albans, Vermont)

"This is a unique resource," says Nathan

Mayo Clinic PM&R Update

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PM&R Update is written for physicians and should be relied upon for medical education purposes only. It does not provide a complete overview of the topics covered and should not replace the independent judgment of a physician about the appropriateness or risks of a procedure for a given patient.

Contact Us

Mayo Clinic welcomes inquires and referrals, and a request to a specific physician is not required to refer a patient.

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K. LeBrasseur, PhD, director of the Health-span Assessment Laboratory and member of Mayo Clinic's Departments of Physical Medicine and Rehabilitation and Physiology and Biomedical Engineering. "It will also help

build collaborations with disciplines exploring the impact of novel therapies for disease in laboratory mice on outcome measures such as strength, endurance, and mobility, that many of our patients care about most."

Education Opportunities

13th Annual Mayo Clinic Health System Regional Rehabilitation Providers Conference: *Is My Patient Ready to Go Home: Comprehensive Safety and Disposition Assessment* — February 4, 2012, Rochester, Minnesota. This conference will review and discuss the required evaluations and assessment of patients, in an acute care or outpatient practice setting, to determine their ability to care safely for themselves. For more information about this course, call Jennifer Peterson at 507-293-1541 or visit www.mayoclinic.org/physicalmedicine-rst/education.html.

7th Mayo Clinic Spine Symposium — March 25-28, 2012, Naples, Florida. This program is designed for surgeons as well as nonoperative clinicians with a special interest in the treatment of spinal disorders. The latest advances in the field will be presented through didactic lectures, panel discussions, debates, and case presentations. An audience response system and lively discussion will make the symposium interactive. Maintenance of Certification facilitated self-assessment exams in orthopedics and neurosurgery will be offered as concurrent precourse sessions. For info call 800-323-2688 or e-mail cme@mayo.edu.

American Board of Physical Medicine and Rehabilitation Board Certification, Part II Examination — May 19-20, 2012, Rochester, Minnesota. Part II (oral) examination of the American Board of Physical Medicine and Rehabilitation certification will take place in Rochester, Minnesota. Mayo Clinic's Department of Physical Medicine and Rehabilitation extends a warm welcome to all candidates participating this year.

Diagnostic and Interventional Musculoskeletal Ultrasound — July 19-21, 2012, Rochester, Minnesota. This 3-day course is a collaboration of Mayo Clinic and the American Institute for Ultrasound in Medicine (AIUM). The teaching format consists of lectures, live demonstrations, and extensive hands-on experiences on live models and unembalmed cadavers. This course is appropriate for physiatrists, sports medicine physicians, radiologists, orthopedic surgeons, anesthesiologists, rheumatologists, sonographers, and other clinicians who evaluate and treat patients with musculoskeletal and neurologic diseases. The course format accommodates learners at the beginner and intermediate/advanced levels. Registration will be available online at www.aium.org. For questions, please visit the AIUM Web site, contact Danielle Delanko at delanko@aium.org, or call 800-638-5352 or 301-498-4100.

To view all Mayo Clinic continuing medical education offerings visit www.mayo.edu/cme/.



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