MAINE MEDICAL CENTER RESEARCH INSTITUTE

2020 Year in Review

mmcri.org
This year has been eventful for all of us and for research at Maine Medical Center Research Institute. Despite the onset of the COVID-19 pandemic in early 2020, we were not only able to continue the ground-breaking biomedical and clinical research we conduct at MMCRI and MaineHealth, but were also able to contribute to the understanding of COVID-19 and how to better care for patients with the disease. We were poised to make these contributions through the leadership of Dr. Doug Sawyer, Interim Vice President for Research, and the hardwork and commitment of our excellent investigators in and outside the hospital. This is the value of having such robust research at MaineHealth.

It has also been an eventful year for me as I assumed the role of Vice President for Research in September, 2020. It is an honor to assume leadership of MMCRI and to work with the accomplished scientists and dedicated professionals and staff who make innovative, safe, ethical, and well-funded research possible. The future is bright for MMCRI and research to advance the health of the people of Maine and beyond. Before we look to the future, I would like to acknowledge and celebrate the successes of so many of our investigators and to highlight a few of them. Two rising stars include Dr. Michaela Reagan, who received a prestigious MERIT award from the National Cancer Institute (page 20) to further her research on the incurable blood cancer multiple myeloma, and Dr. Abby Fleisch, who is now part of a multi-site study funded by the National Heart Lung and Blood Institute to further her work on childhood obesity (page 16). Clinical research and clinical trials continue to expand throughout Maine. New grants for Dr. Kristen Woodberry will support her research on improving mental illness outcomes in youth (page 26) and through support from the National Cancer Institute Community Oncology Research Program, the MaineHealth Cancer Care Network (MHCCN) has been able to expand cancer trial sites all over the state and was selected to participate in the NIH-NCI Moonshot BioBank program (page 28).

These successes are the building blocks for the future, as outlined in the 2021 Academic Affairs Strategic Plan. Over the next twelve months, I look forward to working with our scientists, stakeholders, and leaders to further develop research in Cardiovascular Medicine, Oncology, Pediatrics, and Precision Medicine, from bench to bedside, and to bring the voice of Mainers into research by developing a community advisory board, to assure our goals are aligned with theirs. We will also continue the ground-breaking biomedical and clinical research we conduct at MMCRI and MaineHealth, but were also able to contribute to the understanding of COVID-19 and how to better care for patients with the disease. We were poised to make these contributions through the leadership of Dr. Doug Sawyer, Interim Vice President for Research, and the hardwork and commitment of our excellent investigators in and outside the hospital. This is the value of having such robust research at MaineHealth.

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Sincerely,

Elizabeth Jacobs, MD
Vice President of Research
Maine Medical Center Research Institute
In 2017 MMCRI received $20M from the National Institutes of Health to establish a Northern New England Clinical & Translation Research Network (NNE-CTR). Maine Medical Center and the University of Vermont are the lead organizations. Other partners include the University of Southern Maine and the Dartmouth CO-OP Primary Care Practice Based Research Network (Northern New England Practice Based CO-OP).

NNE-CTR's Mission: Enhance the health of people in northern New England (ME, NH, VT), by fostering and coordinating clinical, translational, and educational research activities.

2020 Fast Facts

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2020 Leadership

Executive Administration
Elizabeth Jacobs, MD, Vice President of Research, MMCRI

Research Center Leadership
Thomas Gridley, PhD
Director, Center for Molecular Medicine

Paul Han, MD, MA, MPH
Director, Center for Outcomes Research & Evaluation

Clifford Rosen, MD
Director, Center for Clinical & Translational Research

Susan Santangelo, ScD
Director, Center for Psychiatric Research

2020 Notables

- 2020 NORTABLES
- NNE-CTR participants from Maine, Vermont & New Hampshire
- 549
- 60% women

Pilot Projects

- 23 pilot program letters of intent submitted
- 6 pilot projects awarded*

*2020 added extra COVID-19 pilot projects see fold-out page 16

Top 5 research topics participants are most interested in researching:

- 29% Cancer
- 27% Cardiovascular Health
- 29% Substance Abuse Disorder
- 38% Rural Research
- 24% Aging

2020 Sources of Research Support by Sponsor Type

- 69.5% Federal
- 20.0% Foundation & Nonprofit
- 10.5% Industry

2020 Mohammed

- Staff Members
- Total 2020 Grant Funds
- New Grants Awarded
- Clinical Trial Studies
- Top 3 Clinical Research Areas
- Scientific Publications
- Core Facilities with state-of-the-art equipment and BioBank Tissue Repository which distributed over 2,450 biospecimens
- Learners & Trainees in MMCRI’s Education & Training Program

MaineHealth makes research a priority and also has generously provided support to MMCRI’s operating budget.

2020 MH Operating Subsidy: $10M
The MaineHealth Innovation Center started in the spring of 2020 with a mission to foster a culture of innovation at all levels of MaineHealth (MH) and among our community partners. Susan Ahern, a respected innovation strategist and diplomatic collaborator from the Boston area, also joined MH in March as Vice President of Innovation. Operating across the clinical, academic and research areas of MH, the Innovation Center serves as the connective tissue between research, education and care. What is innovation? It is a novel idea or solution that solves an unmet care need and can include a new process, care team model or product. The MH Innovation Center keeps the best interests of patients, providers and our community at its core.

The Innovation Center was getting off the ground in March 2020 at the onset of the COVID-19 pandemic. MH tasked the team with finding a solution to the broken global supply chain of N95 respirators. Looking to healthcare colleagues across the country, the team presented a UV-C light decontamination process to safely allow for the reuse of N95 respirators. Within six weeks, a MH UV-C facility was built in Portland and thousands of N95s at various systems locations were identified, tagged, collected, decontaminated and stored, ready to be deployed in the event of a dire Personal Protective Equipment (PPE) shortage. Over 40 MH care team members contributed to this interdisciplinary project - from MMCRI investigators to supply chain leads to process improvement specialists to legal affairs staff.

As it turned out, MH was able to restore N95 supply levels before any reprocessed N95s were reintroduced to the front line care team. The facility was used, however, to reprocess N95s from local Emergency Medical Services agencies in Cumberland County. For several weeks, MH helped keep our local first responders properly equipped with N95s so they could continue to serve our community.

The success of the N95 UV-C reprocessing project hinged on community partners like the University of Maine, the State of Maine, and Bowdoin College to name a few, who all joined MH to offer research expertise, testing and industry connections. This impressive system and state-wide effort shows that innovation is everywhere, making anything possible.

Dr. Paul Han will be leaving the Center for Outcomes Research and Evaluation (CORE) at MMCRI at the end of 2020, to accept a new position as Senior Scientist with the National Cancer Institute. During Paul’s 11-year tenure, 10 as CORE’s Director, he has overseen the significant growth of CORE’s externally funded research portfolios, partnerships, and educational programs. Under Paul’s leadership, CORE has successfully recruited numerous faculty and staff from around the country, and developed new areas of expertise to advance CORE’s scientific mission. For the past 4 years, Paul has served as Principal Investigator for the Maine Lung Cancer Coalition (MLCC), a $5.6 million statewide program grant from the Bristol Myers Squibb Foundation, Maine Cancer Foundation, and Maine Economic Improvement Fund through the University of Southern Maine. Paul has led the MLCC’s research, implementation, and policy work in advancing evidence-based lung cancer prevention and screening throughout Maine and nationally. Paul has also led CORE’s partnership with the Jackson Laboratory on the Maine Cancer Genomics Initiative, a statewide grant to implement and study the use of genomic tumor testing with oncology patients in community practice settings. In addition to his administrative and research leadership, Paul has served as an educator and mentor, teaching Tufts University School of Medicine trainees at all levels, and mentoring early career investigators at CORE, MMC, and Tufts. Dr. Rebecca Hutchinson, CORE Faculty Scientist and Interim Division Director of Palliative Care at MMC, reflects on the mentorship she has received from Paul over the past 5 years: “While I learned a lot of really critical research and writing skills from Paul, I will be most grateful for his investment in me and my career — his advice was always clearly centered in what was most likely to help me reach my personal career goals. Paul will be sorely missed.”

Paul leaves CORE well positioned for continued growth and success. Thank you, Paul, for being a valued leader, mentor, colleague and friend. While you will be greatly missed, we wish you the best as you begin this exciting new chapter in your career!
RESEARCH RETREAT GOES VIRTUAL

The annual Costas T. Lambrew Research Retreat was virtual from start to finish this year. The Research Retreat, typically a one-day symposium held at the Dana Center, successfully pivoted to a virtual format due to the COVID-19 health pandemic. The event, designed to foster collaboration and identify opportunities to strengthen our Institution’s research efforts, started on May 6 with a welcome video from MMC Chief Academic Officer and Interim VP of Research, Douglas Sawyer, MD, PhD. Attendees had online access to recorded talks from eight award-winning presenters, full sorting and viewing capability of all poster files submitted, and other videos from nine research resource teams.

On May 6 over 200 physicians, nurses, scientists and trainees from MaineHealth came together via Zoom for the virtual keynote speaker, Dr. Virginia Lee, PhD, MBA, Professor of Pathology and Laboratory Medicine, University of Pennsylvania Perelman School of Medicine. Department of Emergency Medicine and Retreat Co-Chair, Tania Strout, PhD, introduced Dr. Lee, who spoke on the Transmission of Misfolded Proteins in Neurodegenerative Disorders: A Common Mechanism of Disease Progression.

“Dr. Lee’s talk was a wonderful summary of the work that she and her team have been engaged in to help develop scientific understanding of the mechanisms underlying important neurodegenerative diseases such as Alzheimer’s, Parkinson’s, frontotemporal dementia and amyotrophic lateral sclerosis. It was fantastic to hear about how her work in the lab translates to potential drug discovery and therapeutic innovation to advance clinical practice in this area. We are especially glad that Dr. Lee shared her career trajectory and development of her program of research as a model for our learners and early-career faculty” said Dr. Strout.

The day ended with a zoom social hour. Kerri Barton, Research Navigator at MMCRI and Retreat Co-Chair commented, “I was inspired by the response and engagement from many colleagues across the institution. Even though we were physically apart from each other, there was shared excitement for all of the great research done across MaineHealth.”

ACKNOWLEDGEMENTS

Thank you to the individuals and organizations for helping us make 2020 a year of growth and discovery for Maine Medical Center Research Institute. With your support and partnership we will achieve even greater things in the years ahead.

Private Foundations and Institutes
- 340B Health Fund
- American Heart Association
- American Thrombosis and Hemostasis Network
- Anthem Blue Cross and Blue Shield Foundation LLC
- Bristol-Myers Squibb Foundation
- CTB Foundation
- Conquer Cancer Foundation
- Cytec Fibrosis Foundation
- Harold Alfond Foundation (in collaboration with The Jackson Laboratory)
- Hitchcock Foundation
- Interscience Accreditation Commission
- Linda Tallen and David Paul Kone
- Educational and Research Foundation
- Maine Brain Aneurysm Awareness Committee
- Maine Cancer Foundation
- Celia Lipton Farris and Victor W. Farris Foundation
- Home Community of the Maine Community Foundation
- Maine Technology Institute
- Nancy Luste Marks Family Foundation
- Patient-Centered Outcomes Research Institute
- Sidney R. Buer, Jr. Foundation
- Simons Foundation
- Society to Improve Diagnosis in Medicine
- The American Cancer Society
- Tufts University Charlestown Fund
- Natalie V. Zacker Research Center for Women Scholars Award
- ZOLL Foundation

Federal Funders
- Centers for Disease Control and Prevention
- Health Resources and Services Administration
- National Institutes of Health
- United States Department of the Army
- United States Department of Veterans Affairs

State of Maine
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- Smith & Nephew, Inc.
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Collaborative Partners
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- Engaged Research Core
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- University of Vermont
- University of Maine System
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- Tufts Graduate School of Biomedical Sciences
- Tufts University School of Medicine Clinical and Translational Science Institute

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- Ms. John R. Benoit
- Ms. Susan J. Bernier
- Pauline Bill Trust
- Ms. and Mrs. Richard S. Biagia
- Ms. Margaret Bodington
- Ms. Jennifer M. Boucher
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- Ms. Darlene M. Frost
- Dr. Jordan L. Bundy
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- Ms. Debra D. Burris
- Ms. Amy B. Caron
- Ms. Brenda Chase
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- Mr. Michael W. Churchill
- David E. Clark, M.D. and Susan Clark
- Mr. and Mrs. George B. Clark
- Mrs. Deborah A. Corben
- Mrs. Leeanan Costello
- Mrs. Lisa A. Cox
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- Ms. Sandra T. Coshman
- Ms. IsyAnn C. Cyt
- Ms. Stephenia Dugger
- Mr. and Mrs. Richard B. Dambrie
- Mrs. Stacy E. Davis
- Dr. Jessica Davis-Knowlton
- Mrs. LeeAnn Costello
- Mrs. Deborah A. Corbeau
- Mr. and Mrs. Richard B. Dambrie
- Mrs. Tracy E. Davis
- Mrs. Debra A. Bourgoin
- Ms. Sheila Desouza
- Ms. Susan L. Desmarais
- Ms. Beth De Tine
- Ms. Anne M. Dew
- Ms. Pamela J. Dobson
- Ms. Melissa M. Doughty
- Ms. Beth De Tine
- Ms. Susan L. Desmarais
- Ms. Sheila Desouza
- Ms. Susan L. Desmarais
- Ms. Beth De Tine
- Ms. Anne M. Dew
- Ms. Pamela J. Dobson
- Ms. Melissa M. Doughty
- Ms. Ashley M. Dagosty

NOTEWORTHY
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Ms. Lisa K. Zeien
Kee D. Zimmerman, DO

Summertime Scholarship Fund
Dana and Hilda Ray Willard Endowed Fund for Research Education
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Berry Heart Research Fund
Paul Gray Fund
Thomas W. Holden & John and Holly Benoit Endowed Fund for Research Education
Konkel Family Endowed Fund for Research

Summer Student Research Program Benefactors

Thank you to the following benefactors for their generous support of MMCRI’s Summer Student Research Program. This program offers opportunities for undergraduates and medical students to participate in robust academic year internships as well as intensive 10 week summer experiences.

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Medical Mutual Insurance Company of Maine Scholarship Fund

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VECTOR-BORNE DISEASE LAB JOINS LYME DISEASE INITIATIVE

In 2020, MMCRI’s Vector-Borne Disease (VBD) Lab began a partnership with Tufts University in the “Lyme Disease Initiative,” which promotes outstanding, interdisciplinary research in all aspects of Lyme disease, with the goal of eradicating Lyme disease as a rising human health problem by 2030. Tufts has an outstanding history of contributions to basic and clinical science regarding Lyme disease, and the MMCRI VBD laboratory has worked collaboratively with their investigators for over two decades. One goal of the partnership is to have Maine lead the development of a clinical network for assessment of novel diagnostic tests, new treatments, and vaccine trials. A network that included Portland practices, Pen Bay Medical Center and Southern Maine Medical Center has recently completed a National Institutes of Health (NIH) Small Business Innovation Research study (with MicroBplex, Inc.) of an innovative diagnostic test for early disease. In addition, the MMCRI VBD Laboratory continues its collaborative work on environmental research aimed at disease prevention, supported in part with NIH sub awards.
NEW INITIATIVES FOCUS ON OBESITY RISK IN CHILDREN AND ADOLESCENTS

According to the Centers for Disease Control and Prevention, the prevalence of childhood obesity in the United States grows each year. Childhood obesity increases the risk of serious medical problems including type 2 diabetes, high blood pressure, cancer, heart disease, sleep apnea, osteoarthritis, polycystic ovary syndrome, and gall bladder disease. Dr. Abby Fleisch, Pediatric Endocrinologist and Faculty Scientist at MMCRI, is at the center of two new initiatives to mitigate childhood obesity.

“Bright Bodies,” an evidence-based pediatric weight management intervention, is the focus of a multi-center study led by Dr. Mona Sharifi at Yale University and funded by the National Heart Lung and Blood Institute. Maine Medical Center (MMC) is a part of this newly-funded study with Dr. Fleisch as the Site Principal Investigator and Dr. Victoria Rogers, Senior Director of the MMC Let’s Go obesity prevention program, as a key co-investigator. Maine will be one of three implementation sites for “Bright Bodies.” MH investigators will spearhead implementation of the intervention in the Oxford Hills region in rural Maine.

This also demonstrates how translational research can support and improve implementation of evidence-based interventions.

ABCC was co-led by Healthy Oxford Hills, a community health group in the WMH region, and the NIH-funded Northern New England Clinical and Translational Research Network (NNE-CTR) Rural Core. The NNE-CTR was established to enhance the health of people in Maine, New Hampshire, and Vermont by fostering and coordinating clinical, translational, and educational research activities. MMCRI and the University of Vermont are joined by partners and collaborators to support this work.

In a tiered mentoring structure the students worked with a field coordinator to enhance AB, resulting in 118 new organizations added and 53 updated. Medical students provided four trainings to 20 staff members at two practices and also created and implemented a referral workflow, which strengthens communication between providers and community resources.

This program serves as a low-cost model to enhance community-based referrals for patients who experience barriers related to social determinants of health: the conditions in places where people live, work and play.

‘The ultimate goal from my perspective was to get our providers to implement the tool and thanks to this amazing field team we are hoping that we are very much along that way.’
— Student Member of Field Team

In March of 2020, the NIH awarded a supplement to Dr. Fleisch’s 2019 National Institute of Environmental Health Sciences grant, which evaluates the role of childhood exposure to environmental chemicals on adolescent obesity. This supplement supports the work of Dr. Jenny Carwile, a scientist in the field of nutritional and environmental epidemiology. Dr. Fleisch, Pediatric Endocrinologist and Faculty Scientist at MMCRI, is at the center of two new initiatives to mitigate childhood obesity.

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**MCCRI at MMC**

In July 2020 MMCRI was awarded a five-year, $1.9 million grant by the National Cancer Institute (NCI) of the National Institutes of Health for research directed towards understanding the role of fat cells in the development of multiple myeloma. The results of the study also may apply to many other cancers. The project focuses on the role of fat cells in the development of multiple myeloma. The project is led by Principal Investigator,实施 into how fat cells cause tumor cells to resist therapy and evade cancer drugs. Our goal is to discover vulnerabilities in other cancer cells that can be targeted and translate our findings to new treatments for cancer.

**BASIC & TRANSLATIONAL RESEARCH**

**Michaela Reagan, PhD**

Michaela Reagan is a valuable asset to the state of Maine. Her doctoral research at the University of California, Berkeley, and her postdoctoral fellowship at the Dana-Farber Cancer Institute in Boston, MA, laid the foundation for her current work at MCCRI. Since 2015, she has been a faculty scientist at MCCRI, focusing on the role of the microenvironment in the development of the incurable blood cancer multiple myeloma. The results of her work may have broad implications for understanding the role of fat cells in the development of other cancers, including breast, prostate, and lung cancer.

MCCRI at MMC has announced the completion of two projects funded by the National Center for Advancing Translational Sciences (NCATS). The first project, titled “Remote Care: Ensuring Access to COVID-19 Care,” was led by Dr. Yong-Ri Jin, Dr. Sergey Ryzhov, and Dr. Haifeng Yin. The project aimed to develop and test a new telemedicine platform that allows patients to access COVID-19 care from home. The second project, titled “Remote Care: Ensuring Access to COVID-19 Care for Older Adults,” was led by Dr. Eric Anderson, Dr. Laura Castro-Labrador, and Dr. Marcel Palacio. This project aimed to develop and test a new telemedicine platform that allows older adults to access COVID-19 care from home.

**ENGINEERING NOVEL WAYS TO TARGET CANCER**

**Judy Worrall, PhD**

In May 2020, Judy Worrall, PhD, was awarded a three-year, $1.4 million grant by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health for research directed towards understanding the role of inflammation in the development of atherosclerosis. The project focuses on the role of inflammation in the development of atherosclerosis and its progression to heart failure. The project is led by Principal Investigator, Dr. Volkhard Lindner, and involves collaboration with Dr. Michaela Reagan, Dr. Sergey Ryzhov, and Dr. Haifeng Yin. The project aims to develop new therapies for the prevention and treatment of heart failure.

**RESEARCH HIGHLIGHTS**

**Remodeling**

MMCRI participated in two major multi-site clinical trials of novel coronavirus (COVID-19) treatments. The first study, titled “Remodeling of the Porcine Heart,” was led by Dr. Yong-Ri Jin, Dr. Sergey Ryzhov, and Dr. Haifeng Yin. This study aimed to develop and test a new telemedicine platform that allows patients to access COVID-19 care from home. The second study, titled “Remote Care: Ensuring Access to COVID-19 Care for Older Adults,” was led by Dr. Eric Anderson, Dr. Laura Castro-Labrador, and Dr. Marcel Palacio. This study aims to develop and test a new telemedicine platform that allows older adults to access COVID-19 care from home.

**STUDY OF SPECIFIC GENE MIGHT MELT FROM DEATH**

In early 2020, Dr. Volkhard Lindner, MD, PhD, Faculty Scientist at MCCRI, led a team of researchers who identified a gene that might help patients recover from heart failure. The gene, called CTHRC1, is a potential target for treatment of heart failure. The team found that the gene is upregulated in the hearts of patients with heart failure and that it is downregulated after myocardial infarction (heart attack) in mice. These findings suggest that the gene might be a potential target for treatment of heart failure.

**HIGHLIGHTS**

**Laura Castro-Labrador, BS; Patxi San Martin-Uriz, PhD; Erika Lorenzo-Vivas, PhD; Paula García-Olloqui, PhD; Marcel Palacio, MD; Juan José Maseda, MD; Michaela Reagan, PhD; Sergey Ryzhov, MD; Haifeng Yin, PhD; Beatriz Pelacho, PhD; David Gomez-Cabrero, PhD; Volkhard Lindner, MD, PhD; David Sede, MD, Chief of Critical Care Services; MMCRI. The study is expected to be complete in June 2021.

**MCCRI at MMC**

In July 2020 MMCRI was awarded a five-year, $1.9 million grant by the National Cancer Institute (NCI) of the National Institutes of Health. The funding supports research into how fat cells cause tumor cells to resist cancer treatments and how tumor cells evade cancer drugs. The study is expected to be complete in June 2021.

**Scientists at MMCRI and David Seder, MD, Chief of Critical Care Services, at MMC. The study is expected to be complete in June 2021.**

**Dr. David Seder, MD, Chief of Critical Care Services**

Dr. David Seder, MD, Chief of Critical Care Services, at MMCRI, led a team of researchers who identified a new drug that could prevent illness progression in patients with mild COVID-19. The drug, called Remdesivir, is now available to patients with COVID-19.

**Results**

- Multiple myeloma is a cancer that causes blood cells to grow uncontrollably and can cause other blood cells in the bone marrow to function abnormally. The drug, called Remdesivir, is now available to patients with COVID-19.
- Remdesivir helps to sterilize the most commonly used Filtering Facepiece Respirator (FFP) used by healthcare workers. The drug is now available to patients with COVID-19.
- Remdesivir is a new drug that could prevent illness progression in patients with mild COVID-19.
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RESEARCH ON BONE DENSITY & BONE MARROW FAT MAY IMPACT OSTEOPOROSIS TREATMENTS

Osteoporosis is a widespread bone fragility chronic condition linked to aging and characterized by dysfunctions of cells in bone, often associated with an increase in bone marrow fat. Clifford Rosen, MD, Director, Center for Clinical & Translational Research at MMCRI, is a Principal Investigator on a collaborative multiple PI grant with Dr. Roland Baron of Harvard University. The study will help clarify the role of PTH (drug for treatment of osteoporosis) in mediating bone density and bone marrow fat changes. Bone forming cells (osteoblasts) and fat cells (adipocytes) share a common precursor, and understanding PTH influence on the choice of cells to become a bone or a fat cell is important for the development of future treatments for osteoporosis and fracture healing, as well as for the cell therapy aimed at bone regeneration. This grant will investigate whether preventing bone marrow fat will favor bone formation in response to PTH treatment.

DEPARTMENT OF DEFENSE AWARD FOCUSES ON BURN CARE

Damien Carter, MD, Burn, Trauma & Critical Care Surgeon at MMC and Igor Prudovsky, PhD, Faculty Scientist at MMCRI, were awarded a Department of Defense grant to study tranexamic acid (TXA) and its ability to reduce tissue edema and prevent burn wound conversion. Burn wound conversion occurs when shallow second-degree burns "transform or convert" to deeper wounds. Burn wound conversion is challenging to understand and control for a surgeon. Preliminary research yields that the agent TXA is able to reduce inflammation and swelling after burn injuries as well as protect damaged cells. Drs. Carter and Prudovsky are investigating whether or not TXA is effective in reducing burn wound conversion, and they are evaluating whether this agent can reduce the amount of tissue swelling after burns and the amount of pre-hospital fluid required to rehydrate the burn-injured patient. This exciting work could benefit both military and civilian burn patients in austere environments.

BUILDING RESEARCH EXCELLENCE IN UNDERSTANDING CAUSES OF METABOLIC DISEASE

In 2017, MMCRI was awarded a five-year, $11 million Center of Biomedical Research Excellence (COBRE) grant by the National Institutes of Health. This funding has helped to establish a multidisciplinary research center at MMCRI to model the basis of human metabolic diseases. This program includes partnerships between Maine Medical Center and the University of Maine, the University of New England and Brown University.

The COBRE in Metabolic Networks program is led by Dr. Lucy Liaw, Faculty Scientist, with support from Dr. Cliff Rosen, Director of The Center for Clinical & Translational Research, and Dr. Irwin Brodsky, Maine Medical Partners Endocrinologist and Clinical Advisor. The overall goal of the Metabolic COBRE is to address obesity, osteoporosis and diabetes – all metabolic diseases common in Maine – by understanding pathways that lead to these disorders.

There have been several exciting developments with the program in 2020. Dr. Anyonya Guntur, Faculty Scientist, joined the COBRE as a new project leader. His project focuses on regulation of mitochondria in the bone, which is important for energy generation. The maintenance of healthy mitochondria within bone, which has high energy demands, is important for bone development and has implications for bone disease during aging.

For more details and progress of the metabolic COBRE: mmcri.org/metabolic_cobre.
Improving Outcomes for Patients with Liver Disease

In August 2020, Lesley Gordon, MD, MS, Elizabeth Herrle, MD, Matthew Buttarazzi, MD, and Monica Thim, DO at Maine Medical Center’s Department of Medicine received a grant from the Society to Improve Diagnosis in Medicine, with support from the Gordon and Betty Moore Foundation. Their project’s goal is to improve the care of patients with liver disease. A common complication of liver disease is spontaneous bacterial peritonitis—an infection of the fluid that collects in the abdomen. Their group will develop ways to ensure that patients who are at risk for spontaneous bacterial peritonitis get the right diagnostic testing and treatment as soon as possible when they come to the hospital, to reduce morbidity and mortality.

Our biggest challenge is designing an intervention that will be sustainable moving forward over time, given our Internal Medicine residents are at MMC for only three years, and our Hospital Medicine group is always expanding,” said Dr. Gordon. “At every juncture we will carefully consider: What steps are we taking to make certain that this has a long-lasting impact?”

NIH Clinical Trial Looks at Buprenorphine Treatments for Opioid Use Disorder

The Department of Emergency Medicine at Maine Medical Center (MMC) was chosen in July 2020 as one of 30 emergency department sites across the U.S. to participate in a study to compare the effectiveness of two buprenorphine delivery methods in patients with opioid use disorder. The National Institute of Drug Abuse (NIDA) Clinical Trials Network’s New England Consortium Node, in partnership with investigators at Yale University, is leading the study through the National Institutes of Health (NIH) Helping to End Addiction Long-term Initiative (HEAL).

The study examines whether patients who are given an extended release, seven-day, injectable formulation of buprenorphine at the emergency department will stay in treatment longer than those given a seven-day supply of buprenorphine to take by mouth. All patients are set up with appointments at a medication assisted therapy center for follow up treatment within seven days.

“Clinical trials like this are how we improve treatment for this disease that is a challenge for so many people in our community,” said Michael Baumann, MD, Chair of Emergency Medicine and the Principal Investigator of this study at MMC. “Our goal is to incorporate best practice into our interventions with patients and improve the level of care available for opioid use disorder.”

While patients must meet medical criteria to participate in the study, MMC’s Emergency Department will continue to serve as one of many pathways for patients to enroll in MaineHealth’s Integrated Medicated Assisted Treatment (IMAT) programs, regardless of a patient’s study eligibility. MaineHealth IMAT intensive treatment centers are located throughout southern, western and midcoast Maine.

Trial Shows the Risks & Benefits of Treating Appendicitis with Antibiotics Instead of Surgery

Antibiotics may be a good choice for some, but not all, patients with appendicitis, according to results from the Comparing Outcomes of antibiotic Drugs and Appendectomy (CODA) Trial that were reported this October in the New England Journal of Medicine.

Maine Medical Center (MMC) was among 25 hospitals taking part in the trial, which found that patients who took antibiotics instead of electing to have an appendectomy did not necessarily suffer a worse health outcome. MMC Surgeons Damien Carter, MD, and Bruce Chang, MD, are among the authors of this research, which was the largest randomized clinical trial of appendicitis ever conducted.

“This data indicates that most people with uncomplicated appendicitis may be able to avoid surgery if their condition is initially managed with antibiotics,” said MMC surgeon Damien Carter, MD, who was the site Principal Investigator in Maine on this study. “However, there are advantages and disadvantages to both treatments, and it is important for surgeons and patients to discuss options together.”

While nearly half of the antibiotics group avoided hospitalization for their initial treatment, overall, the time spent in the hospital was similar between groups. “People treated with antibiotics more often returned to the emergency department but missed less time from work and school,” said Bonnie Bizzell, Chair of the CODA Patient Advisory Board. “Information like this can be important for individuals as they consider the best treatment option for their unique circumstance. The CODA Trial is really the first of its kind to capture these measures for appendicitis shared decision making.”

The CODA Trial was funded by the Patient-Centered Outcomes Research Institute. Across the United States, 1,552 participants were randomized to receive appendectomy or antibiotics-first for uncomplicated appendicitis.
NEW GRANTS TO IMPROVE OUTCOMES IN MAJOR MENTAL ILLNESS

In September 2020, Kristen Woodberry, MSW, PhD, Faculty Scientist II at MMCRI’s Center for Psychiatric Research, received a grant from the Sidney R. Baer, Jr. Foundation. The award will help launch and test the feasibility of the “Screening for Early and Emerging Mental Experiences” in Maine (SEE-ME) - an early intervention model to screen youth with mental health issues for psychotic symptoms. The model will be implemented at the following MaineHealth primary care settings: Western Maine Pediatrics, MMP South Portland Pediatrics, and MidCoast Pediatrics/Primary Care/Family Medicine. Administration, training, and data collection will be conducted by staff of the Portland Identification & Early Referral (PIER) program, MMCRI, and Maine Behavioral Healthcare (MBH). This exciting work moves beyond the current outreach and referral model to a model that builds capacity for screening and enhanced care within integrated care teams and bridges the gap between identification and treatment through direct specialized clinician, peer and family specialist outreach.

Dr. Woodberry is also part of another new initiative – Maine Medical Center Outpatient Psychiatry is preparing to start its first treatment group for a PCORI (Patient Centered Outcomes Research Institute) grant awarded in 2019 but put on hold due to COVID-19. Project SUCCESS (Schizophrenia: Understanding and Comparing Cognitive Enhancement and Social Skills training), led by researchers at Beth Israel Deaconess Medical Center (BIDMC), is an 18-site trial comparing two evidence-based treatments for patients with schizophrenia. Cognitive Enhancement Training (CET) and Social Skills Training (SST) have established efficacy for improving social and cognitive functioning untouched by medications. Yet, medications are often the only available treatment in community mental health centers. Dr. Woodberry is the Principal Investigator for the two MMC study sites. MMC staff and trainees will be trained to provide these socially-oriented treatments to up to 96 patients over 3 years. The initial pilot group will establish the feasibility of providing social skills oriented treatments within the context of COVID-19 precautions, offering hope in a time of acute isolation.

THERAPEUTIC HORSEBACK RIDING THE CENTER OF STUDY ON CHILDREN WITH AUTISM

In February 2020, the University of Colorado Anschutz Medical Campus (CU Anschutz) in Aurora, Colorado, in collaboration with MMCRI, was awarded a $2.5 million grant to study why therapeutic horseback riding benefits children with autism spectrum disorder (ASD), particularly children who have co-occurring psychiatric diagnoses.

The grant from the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health will fund a five-year study of the physiological effects of therapeutic horseback riding. A previous study by Principal Investigator Robin Gabriels, PsyD, of the University of Colorado, showed that a 10-week therapeutic horseback riding intervention reduced irritability and hyperactivity while improving the social communication skills of youth diagnosed with ASD. To learn why, Gabriels is now teaming up with MMCRI Faculty Scientist Matthew Siegel, MD, the study’s co-investigator and leader of the Developmental Disorders Service Line of Maine Behavioral Healthcare.

Initially delayed by the Covid-19 pandemic, the study is scheduled to launch in the first half of 2021 at Riding To The Top, a Professional Association of Therapeutic Horsemanship Premier International Accredited Center in Windham, Maine. It will include about 142 children between ages 6 and 16 with ASD and a psychiatric diagnosis. In this randomized, controlled trial, children will be assigned either therapeutic horseback riding or barn activities for 10-week interventions. Both groups will wear heart rate monitors and wrist bands that record changes in electrodermal activity. Saliva samples will also be taken before and 20 minutes after the interventions to measure levels of the stress hormone cortisol. The study will also examine the effective dose of therapeutic horseback riding a child needs to see measurable effects, 5 or 10 weeks, and how long those effects last.

According to Dr. Siegel, “This study is exciting because we are trying to examine the mechanism that underlies the benefits that have been demonstrated with therapeutic horseback riding in autism.” Siegel went on to say, “Learning why this works will hopefully help us create other interventions that address the many challenges that children with ASD face.”
Cancer patients across Maine and Carroll County, New Hampshire now have access to more advanced clinical trials in their home communities, thanks to a major federal research grant awarded to the MaineHealth Cancer Care Network (MHCNN) in 2019. The six-year, $5.1 million award from the National Cancer Institute Community Oncology Research Program (NCORP) is the single largest grant ever extended by the National Cancer Institute (NCI) for clinical cancer research and cancer clinical trials in the state of Maine and offers a robust research arm in partnership with Maine Medical Center Research Institute.

The grant also established the MaineHealth Cancer Care Network Lifespan Program, designed to bring the latest research in cancer prevention, cancer treatment and cancer care delivery to underserved populations. The Lifespan Program is the only oncology program in Northern New England to enroll patients in NCI clinical trials at every stage of the cancer continuum. The network has begun significant work on new studies, and social support needs of rural and socioeconomically disadvantaged MaineHealth (MH) cancer patients. The focus will be on barriers to CMB enrollment and related research by leveraging partnerships with rural sites, advocacy groups and existing collaborations.

Lastly, MaineHealth NCORP had the largest contingent — ten nominations — for consideration of participating on NCI’s Steering Committees and Task Forces this past year. Our program is proudly represented by the election of Drs. Christine Lu-Emerson to the NCI Brain Tumor Steering Committee and Leslie Bradford to the NCI Ovarian Cancer Task Force. They will serve 3-year terms and participate in driving the national research agenda in these two tumor types. For more information on how you might be able to participate in a clinical trial, visit mainehealth.org/cancer.

In addition to Dr. Remick, Peter Rubin, MD, serves as the study’s second principal investigator. Despite the COVID-19 health pandemic, sites almost doubled increasing to 19, with several more MaineHealth locations slated to open in 2021. COVID-19 also brought an opportunity for the MHCNN to broaden study areas; a study of COVID-19 in MHCNN cancer healthcare workers providing patient care during the outbreak, is currently underway thanks to an NCORP $128,000 supplemental award. Drs. Scot Remick, Johnson Liu and Rachit Kumar are leading the research project.

In another exciting development, MHCNN, was selected as one of 20 NCORP sites to participate in the NIH-NCI Moonshot BioBank program. The program seeks to collect longitudinal blood and tissue samples from 1,000 oncology research participants over five years. According to Anne Breggia, PhD, Director of the MMC BioBank and the Principal Investigator on the Moonshot award, “The genomic testing data that is returned to patients and their physicians from the NIH will lead to a better understanding of drug resistance and sensitivity and guide physicians in the selection of optimal treatment options for improved patient outcomes.” In addition, Sue Miesfeldt, MD and Neil Korsen, MD, MsC, have received a National Cancer Institute supplement award to the Cancer Moonshot BioBank project. The Community Engagement award of $50,000 will address treatment education, decision and implementation research skills.
RESEARCH TRAINING & CAREER DEVELOPMENT

CAREER DEVELOPMENT ASSOCIATION PROMOTES PROFESSIONAL CONNECTION

The MMCRI Career Development Association is a trainee and staff-led professional development group originally established in 2009 as a way to provide support and resources to MMCRI’s postdoctoral research fellows. Over the years the group has expanded to include graduate students and research staff, filling identified gaps in professional and career development opportunities. A team of volunteers provides leadership and planning for seminars, career panels, and social events to connect members of MMCRI’s scientific staff with each other and colleagues in the broader biomedical research community. In 2020, the group showed creativity and innovation in finding new ways for scientific staff to connect with one another virtually. Early in the pandemic the group hosted social hours featuring zoom trivia and in the fall, a virtual pumpkin carving contest. The leadership team continued to hold planning meetings throughout the pandemic, running their annual Researcher of the Year awards program, which recognizes a scientific staff member and a research trainee for excellence in research in the previous year. Future plans for the Career Development Association include focusing on a recently initiated peer mentoring group, and continued planning for professional development, seminar speakers, and social events to keep the community feeling connected.

EXPLORING CELLULAR COMMUNICATION BETWEEN MUSCLE AND BONE

Eben Estell, PhD, a Postdoctoral Research Fellow in the lab of Dr. Clifford Rosen, recently received an F32 Ruth L. Kirschstein Postdoctoral Individual National Research Service Award to study cellular communication between muscle and bone. The F32 award provides support to promising post-doctoral scholars in the biomedical research field to promote pathways to becoming independent investigators. The focus of Dr. Estell’s project is the role of irisin, a novel signaling molecule released from muscle following exercise, as well as special cases such as bone loss in microgravity during space flight. According to Dr. Estell, “The research itself is engaging as it relies on a wide range of molecular and cellular techniques, and the collaborative nature of the project is particularly rewarding as I draw on the expertise of leaders in the field of bone biology and cellular signaling.” With the funding support and mentorship provided by the award, he hopes to establish himself as an independent researcher in the bone field, continuing to focus on natural signaling phenomenon that may be leveraged as therapeutic strategies.

The sooner we know exactly how irisin works in bone, the sooner we can figure out how to leverage its signaling function as a therapy to promote healthier, stronger bones in our aging population at risk for osteoporosis and fractures.

—Eben Estell, PhD

K99 AWARD FIRST OF ITS KIND AT MAINEHEALTH

Briana Taylor, PhD, Faculty Scientist at the Center for Psychiatric Research, was recently awarded a National Institutes of Health Pathway to Independence Award, also known as a K99/R00. The K99/R00 provides an opportunity for promising postdoctoral scientists to receive two phases of support in one grant: 2 years of mentored research support, followed by 3 years of independent research support, subject to internal NIH review of progress. This award is the first of its kind at MaineHealth. Dr. Taylor will evaluate the interconnections between age, circadian rhythms, sleep and challenging behavior in youth that are severely affected with autism. In addition, a major component of this project will involve investigating multiple noninvasive sleep measurement methodologies to make sleep research more tolerable for this population. Longterm results from studies like Dr. Taylor’s could lead to interventions to improve sleep and reduce challenging behaviors in youth with autism, thereby improving their quality of life and daytime functioning.

RESEARCH TRAINING AWARD SUPPORTS ASHLEY SOUCY

In 2019, Dr. Lucy Liaw, Faculty Scientist and Director of Research Training Programs at MMCRI became one of the Principal Investigators for a five-year, $1.07 million dollar Institutional Training grant (T32) awarded by the National Institutes of Health to the University of Maine Graduate School of Biomedical Science and Engineering (GSBSE). The grant supports the training of GSBSE PhD students in biomedical science and engineering. MMCRI is one of six institutions throughout the state where GSBSE students perform mentored thesis research, making discoveries that help physicians and researchers better understand human disease. This year Ashley Soucy was awarded a T32 spot for her work in Dr. Liaw’s lab. Ashley’s work addresses the question of why obesity is a risk factor for cardiovascular disease. She is interested in studying how fat cells send signals to blood vessels to affect vascular health.

Education & Training Fast Facts:

- PhD Students: 18
- Master’s Students: 3
- Post-Doctoral Research Fellows: 7
- Academic Interns, over 15 Labs & Research Areas: 21
- International Scholars: 5
- Maine Medical Center Students & Residents: 20
GRANT EXPANDS CORE FACILITIES & LAB INSTRUMENTATION

For there to be successful medical research, an institution must have top core facility resources. MMCRI has a series of shared resources and core facilities dedicated to providing the latest equipment and knowledge necessary to assist researchers in their work. In September, Calvin Vary, PhD, MMCRI Faculty Scientist, received a National Institutes of Health (NIH) Shared Instrumentation grant award for over $540,000 for instrumentation that will greatly expand analytical methods for protein, lipid, and other molecular analyses. This new NIH-funded equipment, including a new state-of-the-art mass spectrometer, will improve and upgrade MMCRI’s Proteomics and Lipidomics core facility technologies. The new instrumentation will enable novel approaches that expand protein identification and quantification capabilities. In addition, the new platform will enhance this facility’s support for other broad molecular profiling of cells and tissues, as well as improve statistical rigor for data interpretation.

“This is a major expansion of our core facility at MMCRI,” Dr. Vary said. “It will significantly advance our existing proteomics capabilities to help us better understand the regulation of the complex molecular pathways that contribute to disease processes. This NIH infrastructure award will ultimately advance our understanding of many diseases, such as heart disease, cancer, and metabolic disorders.”

DATA COLLABORATIONS IMPROVE SCIENTIFIC RESEARCH

This year, two closely related initiatives each expand MMCRI’s data-building and collaborating opportunities, as well as serve as catalysts for speeding up the research process. Susan Santangelo, ScD, MMCRI’s Director of the Center for Psychiatric Research, who also leads the Clinical Research Design, Epidemiology and Biostatistics Core of the Northern New England Clinical and Translational Research Network (NNE-CTR), spearheaded both efforts and is the site Principal Investigator for each initiative. Thanks to funding made available by MMCRI’s NNE-CTR, Dr. Santangelo, with the help of David Denton, biomedical informatics engineer, was able to bring the Observational Medical Outcomes Partnership (OMOP) common data model to MaineHealth. The NNE-CTR is an NIH funded program to build clinical research infrastructure in Northern New England.

The OMOP research data warehouse has translated information from the electronic medical records of MaineHealth patients into a Health Insurance Portability and Accountability Act or HIPAA-compliant data set containing a limited amount of personally identifiable data. Dr. Santangelo and Mr. Denton worked with a team to finish building the OMOP research data warehouse in early 2020. The hope is that it will be used by MaineHealth researchers studying many different conditions.

Thanks to MMCRI’s involvement with OMOP and funding from an NIH grant sub-award from West Virginia University, MMCRI is able to participate in the National COVID Cohort Collaborative (N3C). The N3C is a partnership among more than 35 institutions that are funded by the National Institutes of Health, including the Clinical and Translational Science Awards (CTSA) Program hubs, the Clinical and Translational Research (CTR) Program Networks and the National Center for Data to Health (CD2H), with overall stewardship by the National Center for Advancing Translational Sciences (NCATS). Collaborators will contribute and use COVID-19 clinical data to answer critical research questions to address the pandemic and identity potential treatments.

Participating health care organizations send in de-identified clinical, laboratory and diagnostic data from patients tested for COVID-19. The N3C platform aggregates the information into a standard OMOP format, making it available to scientists and clinical investigators exploring how to improve clinical care for those suffering from COVID-19. With the help of David Denton and John DiPalazzo, a data analyst, the data in the MMCRI OMOP research data warehouse are refreshed on a regular basis and transferred to N3C. Ivette Emery, a MMCRI Research Navigator, is tasked with doing outreach and helping investigators access the N3C data in the NIH Enclave.

“Both the OMOP common data model and the N3C platform allow researchers from many different institutions to collaborate on healthcare solutions without having to share personally identifiable information about their patients,” said Dr. Santangelo, the site Principal Investigator for N3C at MMCRI. “Each of these tools will facilitate collaborations that may help us save lives.”

For more information on N3C: ncats.nih.gov/n3c

BUILDING RESEARCH INFRASTRUCTURE FOR THE FUTURE

Anticipated new mass spectrometer— the SCIEX 6600.
MMCRI is already one of the most innovative research organizations in the nation.

*With your help, we can achieve even more.*

By donating to MMCRI, you help bring the latest scientific discoveries to the bedside and improve the quality of care patients receive. Today’s groundbreaking study could be tomorrow’s life-saving treatment. Your gift will help support research that furthers our understanding of disease processes, which enables us to develop better diagnostics and treatment.

Areas of opportunity for support of MMCRI’s laboratory-based or clinical research projects include: Cardiovascular Disease, Cancer, Metabolic Disease, Molecular Biology and Genetics, Clinical Trials, Psychiatric Research, and Vector-Borne Diseases.

Our efforts go beyond research, as well: by supporting our summer student scholarships, you will help us educate and cultivate the next generation of researchers, and ensure that the quest for knowledge and insight continues for years to come.

**If you’re interested in supporting the work of Maine Medical Center Research Institute, please contact Kristen Crean of the Philanthropy Department at (207) 662-3895 or by email at kcrean@mmc.org.**