Institute of Medicine

Advancing Human Health and Wellbeing in Maine and Beyond

Kody Varahramyan
Vice President for Research
and Dean of the Graduate School

David Harder
Director of the Institute of Medicine
Over 100 Faculty in Health and Life Sciences

<table>
<thead>
<tr>
<th>Health Sciences</th>
<th>Life Sciences</th>
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<tr>
<td>Nutrition</td>
<td>Biology</td>
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<td>Nursing</td>
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<td>Kinesiology</td>
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<td>Pre-Med</td>
<td>Microbiology</td>
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<td>Bioinformatics</td>
<td>Social Work</td>
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<td>Sociology</td>
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<td>Ethics</td>
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<td>Communication Sciences and Disorders</td>
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- Biomedical Sciences
- Biomedical Engineering
- Psychology
- Neuroscience
- Microbiology
Pre-Med Programs

Animal and Veterinary Sciences
Biology
Biomedical Engineering
Chemistry
Food Science and Human Nutrition
Health Professions
Kinesiology and Physical Education
Molecular and Biomedical Sciences
Neuroscience
Psychology
Health and Life Sciences

Undergraduate Programs

Biochemistry
Biology
Biomedical Engineering
Biophysics
Communication Sciences and Disorders
Child Development and Family Relations
Microbiology
Human Development
Health Professions
Nursing
Kinesiology and Physical Education
Psychology
Molecular and Cellular Biology
Social Work
Food Science & Human Nutrition
Health and Life Sciences

Graduate Programs and Research

Master’s Programs

• Biochemistry
• Biomedical Engineering
• Bioinformatics
• Microbiology
• Communication Sciences & Disorders
• Psychological Sciences
• Social Work
• Nursing
• Family Nurse Practitioner
• Kinesiology and Physical Education
• Food Science and Human Nutrition

Doctoral Programs

• Biomedical Science
• Biological Sciences
• Biochemistry and Molecular Biology
• Clinical Psychology
• Psychological Sciences
• Biomedical Engineering
• Microbiology
• Food Science and Human Nutrition
Genesis

UMaine Medicine Initiative

• Launched in Fall 2018
• Provided coordinated and synergistic support for growth and development of research and scholarly activity in health and life sciences at UMaine
• Better positioned the university with related community outreach and engagement efforts
Emergence of a transformative and coordinated community of collaborating researchers and educators, who in partnership with health care providers and other stakeholders are dedicated to the advancement of human health and wellbeing in the state of Maine and beyond, through discovery and learning in health and life sciences, from basic and translational research, to clinical practices and healthcare workforce development.
Reasons for Transitioning from UMaine Medicine to Institute of Medicine

- To further grow the benefits derived from UMaine Medicine
- To build on the solid foundation created by UMaine Medicine
- To provide the Institute the proper status that would enable optimum growth in research and scholarly activity in health and life sciences, in conjunction with engagement with the outside world.
Vision
To make Maine a model for a healthy state.

Mission
To develop through innovative and coordinated research, education, and strategic partnerships transformative solutions that enhance the health and wellbeing of the citizens of Maine and beyond.

Goals
To advance medicine and healthcare in Maine and beyond.
To elevate the University’s prominence in health and life sciences.
To develop a national model for rural medicine and healthcare.
To enable attainment of external resources to support the Institute’s mission goals.
Benefits

• To support in a coordinated and synergistic manner faculty, staff, and students engaged in research and scholarly activity in health and life sciences
• To bring the relevant university centers under the same umbrella, synergizing them to reach their full potential and impact
• To provide the platform for the creation of new centers of excellence in health and life sciences
• To grow the university’s state-wide and national partnerships, including with hospitals and healthcare providers
• To enable significant increase in external funding in support of faculty research and scholarly activity in health and life sciences
• To capitalize on existing partnerships and develop new ones with institutions in Maine and beyond to enhance workforce development.
Organizational Structure

Leadership Team
Institute Director and the heads of its major centers and partnering units and programs.

Steering Committee
Representation from the health and life sciences community from across the university working closely with the Leadership Team.

External Advisory Committee
Representation from major healthcare systems in Maine working closely with the Leadership Team.
Getting Affiliated with the Institute

Affiliation with the Institute follows the University of Maine Research Center and Institute Faculty Appointment Guide.

The appointment types consist of Joint, Associate, Research, and External Associate.
Research Thrust Areas

Rural Health
Rural Healthcare & Community Wellbeing

Diagnostic Medicine
Bioimaging & Radiomics

Medical Humanities
Arts & Bioethics & Social Sciences

Immune System
Diseases & Disorders
Major Anticipated Outcomes

Enhance interactions with area health care providers including Northern Light Health Care (EMMC, Acadia, etc.), St. Joseph Healthcare, Penobscot Community Health Center and others.

- Development of Research MOUs will foster collegial interaction between University faculty, physicians and other healthcare providers.

- Provide guidance on matters related to health and life sciences including: translational research, public health, rural outreach, community engagement, and workforce development.

- The Institute will serve as a bridge connecting the healthcare community with the University
Enhance interactions with research institutions including MDI Biological Laboratory, The Jackson Laboratory, Maine Medical Center Research Institute, and other colleges and universities within the state and beyond.

- Development of core resources encouraging scientific collaboration and maximization of resources.
- Host symposium and workshops on a statewide and national level highlighting research done in Maine.
- Strengthen biomedical and engineering research education and training throughout the state.
Serve as an umbrella under which faculty engaged in life sciences, social sciences, biomedical engineering and biophysics can find common ground and an enhanced profile.

- Enhance the University’s profile with NIH and other agencies with the goal of increasing funding and development of centers of research excellence.

- To support in a coordinated and synergistic manner faculty, staff and students engaged in research and scholarly activity in health and life sciences.

- To enable the university to realize its expected role as the state’s foremost institution in setting agendas for the realization of health and life sciences R&D and community engagement in Maine, thereby, driving social and economic growth.
Institute of Medicine

Example of a Current Research Project

Muscle and Healthspan

This project is centered on the discovery of mechanisms that underlie skeletal muscle plasticity and health, using the zebrafish model. The research of skeletal muscle is important because its quality predicts immune system health, better recovery from illness and injury, and healthy aging.

Dr. Clarissa Henry
Dr. Ben King
Dr. Sam Hess
Dr. Josh Kelley
Example of a Current Research Project

Mast Cell and Mitochondrial Disruption by Triclosan and Related Antimicrobials

This project investigates the effects of Triclosan (TCS) and TCS substitutes on plasma membrane potential, mast cell function, mitochondria and various cell types. Dr. Gosse has previously discovered that TCS inhibits the function of mitochondria and immune cell type mast cells.

Dr. Julie Gosse
Dr. Robert Gundersen
Dr. Sam Hess
Bridging the Gap in Breast Cancer Imaging

Continued efforts are needed to improve the diagnostics and understanding of breast cancer, which affects nearly 1 in 8 women in the United States. Building on Dr. Khalil’s previous work in this area, this project is focused on finding the missing link to bridge the gap of tumor microenvironmental knowledge from the research bench to clinical imaging.

Example of a Current Research Project

Dr. Andre Khalil
Dr. Karissa Tilbury
Dr. Scott Collins
The long-term goal of this project is to develop medical implants that reduce the likelihood of post-surgical infection. The team is working on the design and manufacturing of a prototype implant using this new technology.
Role of Extracts from Wild Blueberries on Wound Healing

The Klimis-Zacas lab recently documented in vitro that a chemical compound extracted from Maine wild blueberries increased the speed of wound closure by 38% above the control. In light of these findings, the team is now working to validate those results and design a patch or spray prototype to be tested on humans.
For more information visit
www.umaine.edu/medicine/

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Office of the Vice President for Research and
Dean of the Graduate School
University of Maine
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Orono, ME 04469

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Email: cecile.ferguson@maine.edu
Thank you!

Questions?
Maine Chronic Kidney Disease (ME-CKD) Genetics Pilot Study

Benjamin King, Ph.D.
Department of Molecular and Biomedical Sciences
UMaine Institute of Medicine
University of Maine

Jim Jarvis, M.D., FAAFP
Director of Education and Clinical Research Center
Northern Light Eastern Maine Medical Center
Prevalence of Chronic Kidney Disease (CKD) in Maine

21,820 individuals in Maine on Medicare had CKD
1,124 of these individuals were on dialysis

8th Highest State Among Medicare Recipients (65+)

US Renal Data System Annual Data Report, 2018
Goal: Identify Genetic Loci Associated with CKD

Primary objective:
1) Identify putative genetic loci that increase risk for CKD

Secondary objectives:
1) Examine associations between known CKD risk loci among study participants
2) Compare genetic data with other CKD studies as a way of assessing whether study participants are a representative cohort of CKD subjects

High-Level Summary of Protocol
Genome-Wide Association Studies (GWAS) Associate Genetic Loci with Disease Phenotypes
**Unique Aspects of ME-CKD Genetics Pilot Study**

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
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<tbody>
<tr>
<td>1. Provision of signed and dated informed consent form</td>
<td>Diagnosed with any of the following:</td>
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<tr>
<td>2. Stated willingness to comply with all study procedures and availability for the study</td>
<td>1. Stage I CKD</td>
</tr>
<tr>
<td>3. Male or female, aged 18 or older</td>
<td>2. Stage V CKD</td>
</tr>
<tr>
<td>4. Diagnosed with Stage II, Stage III, or Stage IV CKD</td>
<td>3. Diabetes</td>
</tr>
<tr>
<td>5. Ability to provide a blood sample</td>
<td>4. Cystic kidney disease</td>
</tr>
<tr>
<td></td>
<td>5. Glomerulonephritis</td>
</tr>
<tr>
<td></td>
<td>6. Cancer</td>
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Participant genomes will be characterized using whole genome shotgun sequencing
All of Us Research Program

Goal: Create one of the largest and most diverse health databases to accelerate biomedical research and improve health.

1,000,000 participants
- Electronic health record data
- Surveys
- Biospecimen for genomics and laboratory assessments
- Standardized physical measurements

Of 224,143 participants:
- 706 cases
- 166,599 controls

https://www.researchallofus.org/data-snapshots/
Summary of Maine Chronic Kidney Disease (ME-CKD) Genetics Pilot Study

• Goal: Identify putative genetic loci that increase risk for CKD
  • Genome-Wide Association Study

• New collaborative clinical research project with Northern Light – Eastern Maine Medical Center
  • EMMC Clinical Research Center
  • Study protocol approved by EMMC IRB
  • Establishes BioBank for project at the University of Maine

• Access to All of Us Research Program established

• Help enable other clinical research collaborations
Acknowledgements

Northern Light Healthcare

Janet Baylaran, PhD
Liz Carroll
Clinical Research Center Staff
Barbara Sorondo, MD
Jim Jarvis, MD

Steering Committee Members

Hermann Haller, MD, MDI Biological Laboratory
Jens Reuter, MD, The Jackson Laboratory
David Harder, PhD, University of Maine

University of Maine and University of Maine System

Jason Charland, Office of Research Development
Chris Boynton, Office of Research Administration
Rachel Piper, University Services: Strategic Procurement

Funding from the University of Maine System's Research Reinvestment Fund
GSBSE Overview

• A unique collaborative graduate program comprising the five institutions which represent the biomedical research community within the State of Maine

• University of Maine is the degree granting institution

• Four private partnering institutions:
  - The Jackson Laboratory
  - MDI Biological Laboratory
  - Maine Medical Center Research Institute
  - The University of New England

• The largest Ph.D. program in the STEM area in Maine
GSBSE Overview

- 2006 - Founded as the Graduate School of Biomedical Science (GSBS) as a result of a mandate by then Governor Baldacci in his January 2005 State of the State address to bolster research and education in biomedical science.

- 2012 - Graduate School of Biomedical Science (GSBS) became Graduate School of Biomedical Science & Engineering (GSBSE)

<table>
<thead>
<tr>
<th>Institution</th>
<th># Students</th>
<th># Alumni</th>
<th># Faculty</th>
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<tbody>
<tr>
<td>UMaine</td>
<td>26</td>
<td>25</td>
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<td>4</td>
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<td>1</td>
<td>30</td>
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<tr>
<td>PSM</td>
<td>21</td>
<td>6</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>75</strong></td>
<td><strong>71</strong></td>
<td><strong>195</strong></td>
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Current Degree Programs:
- Ph.D. in Biomedical Science
- Ph.D. in Biomedical Engineering
- Professional Science Masters (PSM) in Bioinformatics
Four Core Functions:
• Research
• Education
• Service
• Dissemination

in Developmental Disabilities
Developmental Disabilities Assistance and Bill of Rights Act of 2000 (“DD Act”)

• To assure the people with developmental disabilities and their families *participate in the design of* and *have access to*:
  • needed community services, individualized supports, and other forms of assistance that promote:
    • *self-determination*
    • *independence*
    • *productivity*, and
    • *integration and inclusion in all facets of community life* through culturally competent programs.
The Kennedy Family at Hyannis Port, Massachusetts, 1931
Photo by Richard Sears in John F. Kennedy Presidential Library and Museum, Boston
Areas of Emphasis

- Quality Assurance
- *Education and Early Intervention*
- Child Care
- Health
- Employment
- Housing
- Transportation
- Recreation
- Other Services, Including Formal and Informal Community Supports, that Affect Quality of Life
Community Advisory Committee
NH-ME LEND: Leadership Education in Neurodevelopmental and Related Disabilities
Supporting Children of the Opioid Epidemic

• Build nationwide provider capacity in applying evidence-based practices in screening, monitoring, and supporting children diagnosed with NAS, NOWS, or suspected of being impacted by opioid use, trauma, or related exposure

• Telepractice model: Extension for Community Health Outcomes (ECHO™)
Afari™

Lent by Mobility Technologies
Mobility Aid, AFARI, 2010-14
Author: Cooper Hewitt, Smithsonian Design Museum
https://collection.cooperhewitt.org/objects/1158847061

cidis.umaine.edu/research-projects/afari
Some Other CCIDS Activities

• Undergraduate minor in Disability Studies
• Graduate Certificate
• Research, Evaluation, and Technical Assistance on Child Care and Education of Children with Disabilities
• and much more
Covid-19 Activities

• “Social Undistancing” Project
• Disparities in Covid Impact
• Equitable Access to Treatment and Access to Supports
Covid-19 Activities

- “Social Undistancing” Project
- **Disparities in Covid Impact**
- Equitable Access to Treatment and Access to Supports
Covid-19 Activities

• “Social Undistancing” Project
• Disparities in Covid Impact
• Equitable Access to Treatment and Access to Supports
Association of University Centers on Disability
https://www.youtube.com/watch?v=EG5u8ybB92o
Center on Aging

UMaine Institute of Medicine Webinar – Impact Week
September 29, 2020

Lenard W. Kaye, DSW, PhD
Professor and Director
Center on Aging Overview

• Established in 2001

• The only unit of UMS devoted exclusively to issues of aging and the aging process

• An interdisciplinary research center within the University of Maine

• Thematic areas of emphasis
  • Rural aging
  • Aging and thriving in place
  • Engaged/Productive aging

• Three focal areas:
  ▪ Research and Evaluation
  ▪ Education and Training
  ▪ Service/Technical Consultation
Students Have Played an Enormous Role From Day 1

Student volunteers assist with cataloguing expired prescription drugs being prepared for disposal as part of the Safe Medicine Return for ME program.

Specialized training in geriatrics and gerontology for the next generation of health and human service professionals.

MSW students assist with the annual University of Maine Clinical Geriatrics Colloquium.
Health Promoting Community Service Programming

Helping older adults age-in-place with high quality of life

Placing volunteers in service to our communities

Learning for the fun of it
Education and Training

- Interprofessional **Graduate Certificate** in Gerontology
- Annual **Clinical Geriatrics Colloquium**
- **Health Connection Chats** helping Mainers stay safe, well, and connected during the pandemic
- **AgingME** Geriatrics Workforce Enhancement Program
Research on Topics Relevant to Life Span Health Issues

- Screening for Elder Abuse (Maine Health Access Foundation)
- Assessing Geriatric Mental Health Issues (Maine DHHS)
- Disposing Prescription Drugs Safely (U.S. EPA and Maine Drug Enforcement)
- Preventing Older Adult Falls (NIH/NIA)
- Treating Alcohol and Substance Abuse (ME Substance Abuse and U.S. Children’s Bureau, DHHS)
- Strengthening Family Caregiver Supports (Weinberg Foundation)
- Osteoporosis Education for Post-Menopausal Women (U.S. Administration on Aging, DHHS)
- Expanding Older Adult Medical Transportation Services (EMHS)
- Developing Adult Day Care Services (Maine Health Access Foundation)
- Improving Oral Health in Long-Term Care (Lunder-Dineen Health Alliance)

Access to older citizen scientists through our community service programs and our Maine Older Adult Research Subject Registry
Collaboration is Key

Every single initiative at CoA requires extensive and genuine collaborations with community businesses, foundations, public agencies, non-profit organizations, and older adults themselves

- Maine Professional Associations (Pharmacists, Physicians)
- USM/UNE
- Community Health Networks & Coalitions
- Medical Centers/FQHCs
- Community Action Programs/Area Agencies on Aging
Just a Few of the Partnerships Over the Years