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University of Maryland funds cross-campus, joint medicine & AI research

UNIVERSITY OF MARYLAND

COLLEGE PARK, Md. - The University of Maryland, Baltimore (UMB) and the University of Maryland, College Park (UMD) are funding new cross-campus research projects as part of a new joint program that seeks to solve big health care challenges through joint research that draws on the institutions world leading expertise in medicine and artificial intelligence.

The below research awards are the first in a joint UMB-UMD program that will fund big research initiatives that draw on the fields of artificial intelligence and medicine. Known as AIM-HI (AI + Medicine for High Impact), the program was launched a year ago by Vice President for Research Laurie Locascio, Ph.D., in partnership with Deans from both campuses and support from both Presidents. Locascio is Vice President for Research for both UMD and UMB.

"The AIM-HI program unites unique strengths from both campuses in pursuit of breakthrough efforts that will impact and improve human health," said Vice President for Research Laurie Locascio. These teams of investigators are partnering to address major healthcare challenges. I have big expectations for what these teams will be able to accomplish and the impact that it will have on Marylanders and around the world."

The new grants support UMD-UMB teams that are investigating new ways of tackling major medical challenges in four areas: chronic pain, mental health, aging and age-associated diseases, and neonatal opioid withdrawal syndrome.

"The AIM-HI program represents some of our best research collaboration, leveraging our strengths to address real-world healthcare challenges. Not only will this partnering of expertise in medicine and computer science yield new knowledge and new treatments, but it will also lead to countless new collaborations, as we all see what is possible when we work together," said UMB President Bruce Jarrell

AIM-HI supports research with strong potential to contribute major scientific discoveries, secure sizable additional external funding and, ultimately, to lead to meaningful improvements in the quality of the lives of people in Maryland, the region and the nation through improved patient care or treatment. Through the AIM-HI program, these first four awards in total will receive up to $1.8 million in funding over three years.

"With these projects, we are developing new technologies and approaches to relieve some of the most painful and difficult ailments that afflict people in the state," said University of Maryland

President Wallace D. Loh. "The progress we make will demonstrate the power of partnership--the edge that our institutions working together can deliver to Maryland and beyond."

The AIM-HI 2020 awardees

Development of a predictive multi-omics platform for the study of aging and age-associated diseases
UMB researchers: Maureen Kane, School of Pharmacy-Pharmaceutical Sciences; Marta Lipinski, School of Medicine-Anesthesiology and the Shock, Trauma and Anesthesiology Research (STAR) Center; Jace Jones School of Pharmacy-Pharmaceutical Sciences
UMD researcher: Michael Cummings, College of Computer, Mathematical and Natural Sciences (CMNS) - Biology

The research seeks to develop an analytical framework to identify predictive functional relationships between changes in different metabolic parameters during aging. The ultimate goal is to generate testable hypotheses about mechanisms contributing to aging under normal and disease conditions and identification of appropriate interventions.

Precision Therapy for Neonatal Opioid Withdrawal Syndrome
UMB researchers: Seth Ament, School of Medicine-Institute for Genome Sciences & Department of Psychiatry; Dina El Metwally School of Medicine - Department of Pediatrics, and Director of the University of Maryland Medical Center's Neonatal Intensive Care Unit (NICU); Amber Beitelshees, School of Medicine - Program for Personalized and Genomic Medicine & Department of Medicine; Asaf Keller School of Medicine - Chair of the Department of Anatomy & Neurobiology
UMD Researchers: Margret Bjarnadottir, Robert H. Smith School of Business, Department of Management Science and Statistics; Ritu Agarwal, Robert H. Smith School of Business Interim Dean and Chair of Information Systems

The ultimate research goal is to improve clinical decision making in the treatment of neonatal opioid withdrawal syndrome (NOWS). The opioid epidemic has led to dramatic increases in prenatal opioid exposure. Our current tools do not allow us to predict which babies will develop withdrawal or how they will respond to treatment. To address this urgent clinical challenge, the team will develop clinical and genomic biomarkers to predict withdrawal and treatment response in a unique, racially diverse cohort at UMMC and affiliated hospitals.

A Multi-Stage Machine Learning Framework for Prioritization in Mental Health Risk Assessment
UMB researcher: Deanna L. Kelly, School of Medicine, Psychiatry, Maryland Psychiatric Research Center
UMD researchers: Philip Resnik, College of Arts and Humanities, Linguistics and University of Maryland Institute of Advanced Computer Science (UMIACS); Carol Espy-Wilson, A. James Clark School of Engineering, Electrical and Computer Engineering; John Dickerson, College of Computer, Mathematical, and Natural Sciences, Computer Science, and UMIACS

This project seeks to lead a basic shift in how to think about machine learning in mental health by treating the dominant paradigm of individual-level classification or regression not as an end in itself, but rather as providing necessary components in a broader framework, where the central need is to prioritize available resources effectively, given real-world resource constraints. Machine learning is poised to have a large impact on our ability to identify people who are suffering from mental health problems. And mental illness is one of the most significant challenges in healthcare: in economic terms alone, mental illness exceeds cardiovascular diseases and is also more than the projected cost of cancer, chronic respiratory diseases, and diabetes

combined. An increased ability to identify people who need help is going to add an influx of new cases that require assessment and potentially action of some kind, significantly increasing stress on a mental health ecosystem that cannot easily scale up.

Tackling Chronic Pain: Machine Learning-Enabled Biomarker Discovery and Sensing
UMB Researchers: Robert Ernst, School of Dentistry - Microbial Pathogenesis; Richard Traub, School of Dentistry - Neural and Pain Sciences; Alison Scott School of Dentistry - Microbial Pathogenesis
UMD Researchers: Pamela Abshire, Clark School of Engineering - Electrical and Computer Engineering and Institute for Systems Research; Reza Ghodssi, Clark School of Engineering - Electrical and Computer Engineering and Institute for Systems Research; Behtash Babadi, Clark School of Engineering - Electrical and Computer Engineering and Institute for Systems Research

This multidisciplinary research team is uniquely positioned to make important contributions to understanding chronic pain in the gastrointestinal (GI) tract by advancing the scientific understanding and technology of biomarker analysis. The proposed research will use an animal model of comorbid pain hypersensitivity that combines orofacial pain and stress to induce chronic visceral pain hypersensitivity to collaboratively search for novel, localized biomarkers associated with GI pain by: 1) mass spectrometry imaging as well as proteomic, lipidomic and RNA sequence analysis; 2) miniaturized, multiplexed biochemical sensors to measure localized biomarkers in rats; 3) machine learning approaches to facilitate mass spectrometry imaging analysis and correlation of factors across multiple sensing modalities. This work also could serve as proof-of-concept for future developments in data-driven healthcare.

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