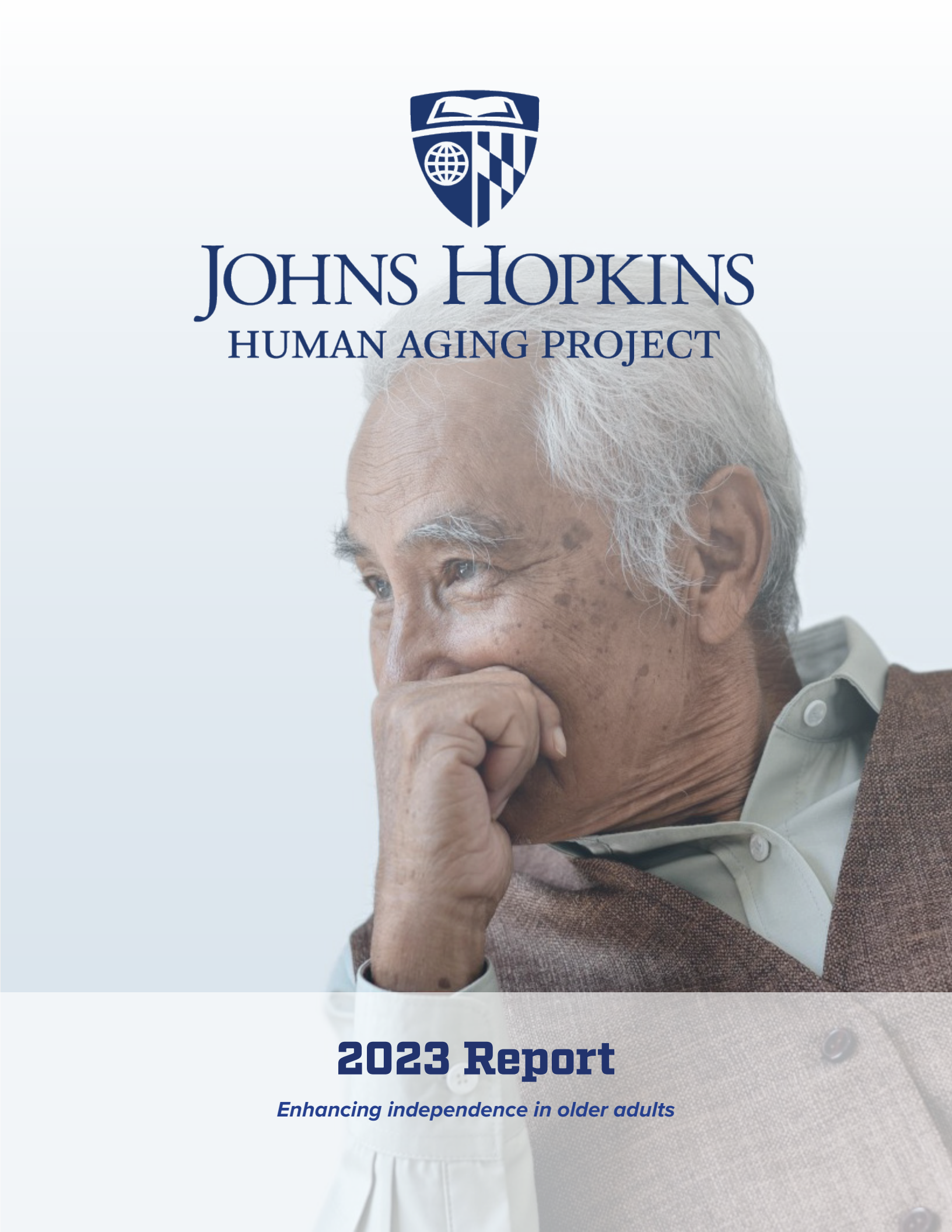
JOHNS HOPKINS
HUMAN AGING PROJECT



2023 Report

Enhancing independence in older adults

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Who We Are

We at Johns Hopkins Human Aging Project are a community of scholars, health care experts, students, and stakeholders dedicated to eliminating age-related functional and cognitive decline, preventing and reducing chronic disease burden, and optimizing resilience in older adults.

Our Mission

We follow the guiding principles of caring, science and justice, and strive to discover and apply novel biological, engineering, and clinical solutions that promote healthy aging for all.

Our Vision

We envision a world in which all older adults can live long and healthy lives, full of meaning, by reducing chronic disease burden and minimizing age-related functional and cognitive decline.

Our Research

We focus on discovering and applying innovative biological, engineering, and clinical solutions that promote healthy aging for all.

Our Goals

- To provide and conduct research that promotes vigorous good health for all older adults using biology, engineering, and clinical translational approaches.
- To educate and train the next generation of scholars focused on healthy aging.
- To rapidly translate new findings into real-world solutions that improve health and well-being though business development efforts.

Our Partners

- **Center for Innovative Medicine**
- **Division of Geriatric Medicine and Gerontology**
- **Johns Hopkins Schools**

  Business
  Engineering
  Medicine
  Nursing
  Public Health

- **Patients and Caregivers**

Letter from the Director

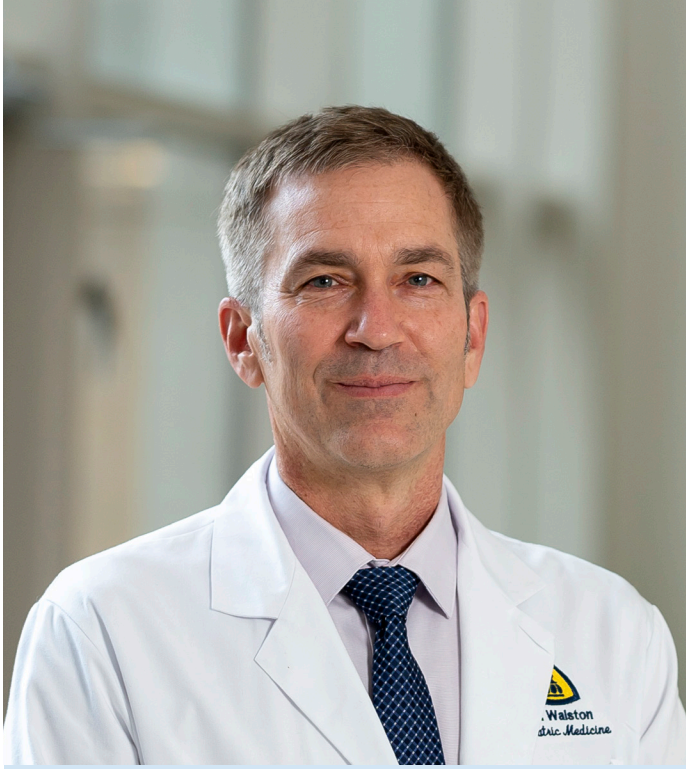
The Johns Hopkins Human Aging Project is a transdisciplinary, aging-focused initiative, established in 2021, with the aim of harnessing core strengths and unique capabilities across the University in the disciplines of clinical care, engineering, and basic biology in order to mitigate the complexities of health-related issues among older adults. This unique research collaborative is focused on developing innovative solutions that can assist all people to live longer, healthier, and more active lives. A diverse community of committed scholars from across the University are sharing expertise, conducting research, and translating findings into innovations that offer the possibility to mitigate the development of age-related disease, cognitive decline, disability, and loss of independence.

Multiple new initiatives related to immunization in older adults, artificial intelligence, technology, frailty, and resiliency are moving forward as we continue to identify and further develop promising new interventions and preventative strategies. We are pleased to share our progress at the Human Aging Project in this 2023 Annual Report, and invite you to continue to follow our progress at: https://hap.jhu.edu.

Stay tuned as we deliver on the promise of this important collaborative initiative!

Jeremy Walston, M.D.

Director, The Johns Hopkins Human Aging Project
Raymond and Anna Lublin Professor of
Geriatric Medicine and Gerontology

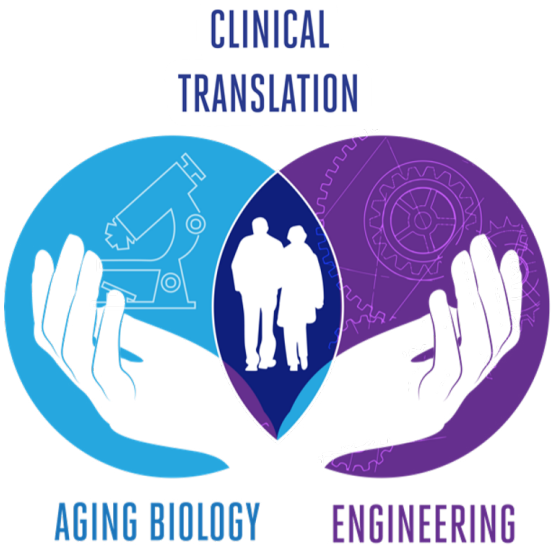


Jeremy Walston, M.D., is the Raymond and Anna Lublin Professor of Geriatric Medicine and Gerontology, a practicing Geriatrician, and the Director of the Johns Hopkins Human Aging Project. He also co-directs the NIA funded Johns Hopkins Older Americans Independence Center (OAIC) focused on frailty, the Artificial Intelligence and Technology Collaboratory (AITC) focused on aging. His research team focuses on aging-related changes in inflammation, stress response, mitochondrial biology, and energy metabolism and on the translation of findings into novel diagnostic, preventive, and treatment strategies that improve health and quality of life for older adults.

Programmatic Updates

New Engineering Space Under Development in Collaboration with the Human Aging Project Affiliated Engineers

The Whiting School of Engineering (WSE) is in the process of building a new clinical and engineering site for aging research within the Mason F. Lord Center Tower on the Bayview Campus. Led by HAP Scholar Najim Dehak, PhD and designed by Human Aging Project (HAP) affiliated faculty members from both the WSE and the JHU School of Medicine, this new space spans approximately 10,500 square feet and will be the home to faculty, fellows, students and staff focused on the development and testing of new technologies and uses of AI to improve the health and well-being of older adults. The space will also support studies funded by the Artificial Intelligence and Technology Collaboratory and undergraduate and graduate students who participate in HAP sponsored Gerotech Incubators. The space will enable meaningful face to face interactions between engineers, gerontologists, geriatricians, trainees, health care providers, and business owners and developers in order to develop, test, implement, and disseminate novel AI and technologies that improve older adults' health and well-being.



New Artificial Intelligence and Technology Pilot Studies

The Johns Hopkins Artificial Intelligence and Technology Collaboratory (AITC) is an NIH-funded national resource that promotes the development and implementation of novel artificial intelligence (AI) and technology approaches to improve the health and well-being of older adults. The JH AITC provides pilot funds for AI/tech development efforts as well as access to relevant stakeholders' groups, tech and AI design expertise, business networking support, and clinical expertise.

Over the past year, 14 pilots have been funded. Examples include:

- A software product intended to aid in the detection of early mild cognitive impairment. The product from the company WaviCo aims to assist clinicians on the front lines of early stages of dementia investigation, management, and treatment.
- A multidisciplinary team of ophthalmologists, engineers, and entrepreneurs at Johns Hopkins University have developed a simple and inexpensive system for cataract detection. The system includes an attachment for a smart phone which can be used for cataract screening. Partnerships will be formed with ophthalmology practices and senior living facilities to further develop this platform and enable simple, accessible, and near real-time diagnosis and referral of vulnerable older adults with age-related cataracts.

- A wearable device is being developed to improve sleep for older adults. Created by a company called Sequoia, it is an easy-to-use headband which promotes slow-wave sleep through acoustic stimulation. Higher quality sleep has been shown to improve the physical and cognitive health of older adults.
- A fall prevention tool that features a handlebar device is in development for use by seniors to improve their balance. The Balance T device may be adapted for use in physical therapy, clinics and at home.
- A virtual reality program for social engagement called ReTreatVR is being developed by the company Virtual Apprentice. This platform is designed to provide senior-friendly immersive experiences to encourage interaction and reduce social isolation.
- A mobile technology app for home use is being developed by Hopkins investigators to detect cognitive changes in older adults. The app will also report these changes to the individual's caregiver.

Additional information can be found at The Johns Hopkins University AITC Website

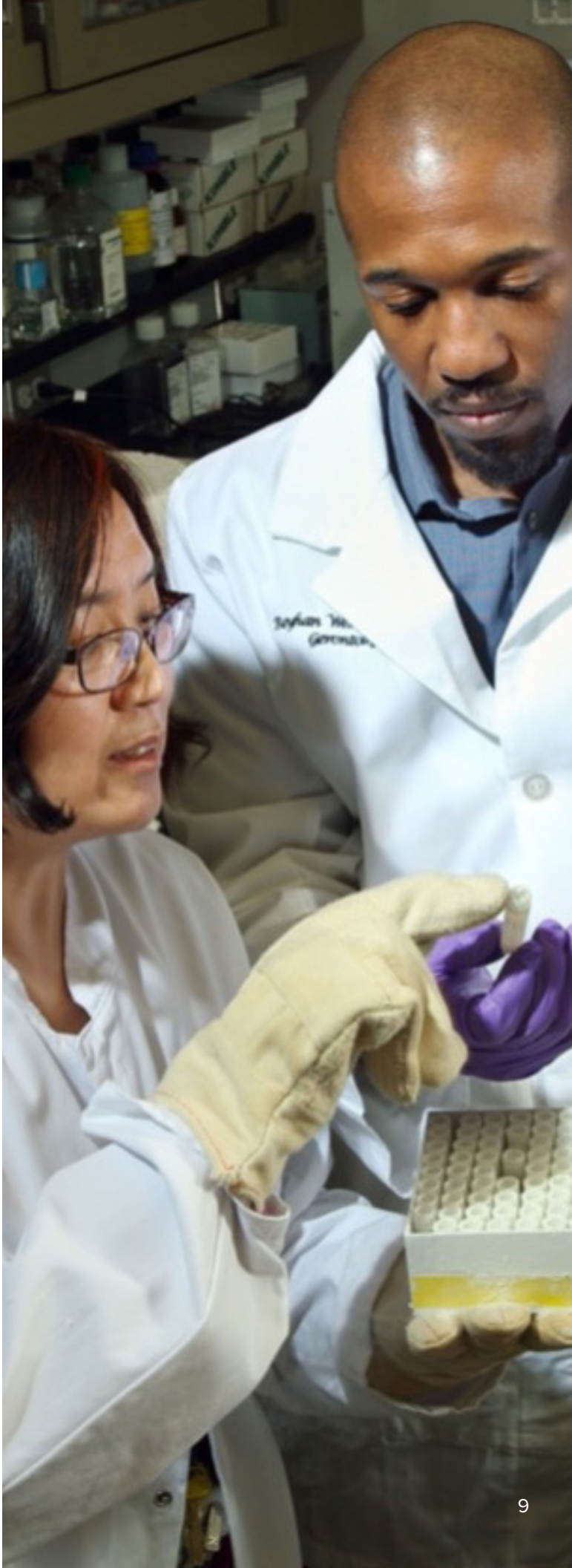
Gerotech Incubator Program researcher Joshua Blair with a prototype of the wearable sleep aid device developed in collaboration with patients and clinicians. The pilot award with Sequoia is taking this device to the next level of development.

Older American Independence Center Funding Renewed for Five Years

A major hallmark of the HAP supported programs has been the Johns Hopkins Older American Independence Center (OAIC) and its frailty focus. The award, which focuses on the etiologies of physical frailty and on ways to prevent and intervene on frailty, was recently funded again by the NIH. This OAIC has led to several innovations important to aging research, including the development of the most utilized tool to measure frailty and the identification of chronic inflammation, dysregulated stress response systems, and altered energy metabolism pathways as key biological characteristics of frailty. The next 5-year cycle, which started July 1, 2023, has added a new research core that supports the development of technologies to identify frailty and to intervene on it. Details can be found at The Johns Hopkins University OAIC Website.

The Johns Hopkins Center on Aging and Immune Remodeling

Under the leadership of HAP scholar Dr. Sean Leng, the Johns Hopkins Center on Aging and Immune Remodeling (JH CAIR) initiative continues to develop novel ways to optimize immune function and promote healthy aging through cutting edge research of the causes and mechanisms of aging and immune remodeling and through translating research discoveries into clinical and public health practice. Discoveries related to aging immune systems will inform new vaccination strategies that better protect older adults from viral infections such as COVID-19 and Influenza.

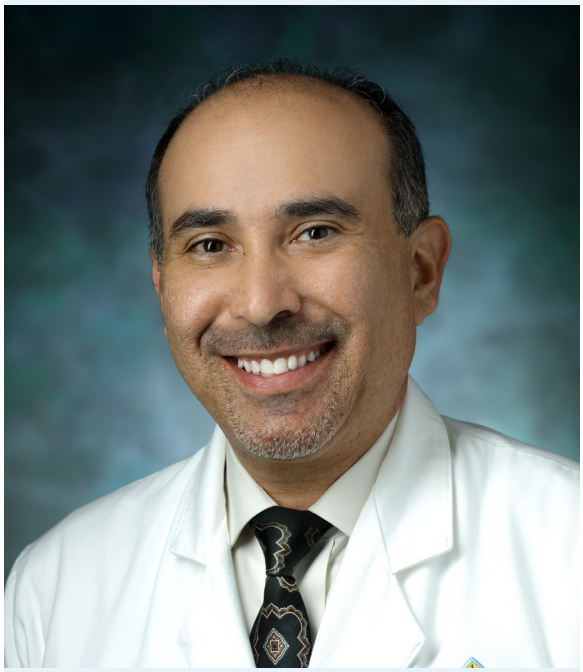


HAP Scholars

Each year, the Human Aging Project makes research funding available for novel research programs and innovative scholars focused on aging-related programmatic development in basic biology, engineering, or clinical translation. This competitive award is offered after a call for proposals and an internal application process that targets an important area of new research. Most awardees are mid-level career faculty that seek funding to develop a project or program that meets the mission and goals of HAP, with special consideration given to those who focus on health disparities and ways to overcome these disparities. The accomplishments are listed on the pages that follow. Additional details can be found HERE.

2021

Peter Abadir, M.D., is the 2021 Salisbury Family CIM/HAP Scholar. He is an Associate Professor of Geriatric Medicine and Gerontology at the Johns Hopkins University School of Medicine, with a joint appointment in the School of Engineering. His area of clinical expertise is geriatric medicine. Dr. Abadir's research interests include etiologies of resiliency and the development of innovative technologies that will improve the health and well-being of older adults. He has been recognized by the Hopkins Department of Medicine with the W. Leigh Thompson Excellence in Research Award, and is the co-principal investigator of the Johns Hopkins Artificial Intelligence and Technology Collaboratory.



Thomas Cudjoe, M.D., M.P.H., M.A. is the 2021 Caryl & George Bernstein CIM/HAP Scholar. He is an Assistant Professor of Geriatric Medicine and Gerontology at the Johns Hopkins School of Medicine. He leverages community-based strategies, mixed-methods, and human centered design to understand and address social isolation with a keen focus on older adults living with low incomes. Notably, he has led work that has demonstrated that socially isolated older adults are at high risk for becoming homebound and developing dementia. He is pushing the field of social connection forward through local and national endeavors including serving as a speaker at the National Academies of Sciences, Engineering and Medicine, serving on the Scientific Advisory Council for the Foundation for Social Connection, and recently serving as a reviewer for the Surgeon General's Advisory Our Epidemic of Loneliness and Isolation. His work has also been featured in the New York Times, Wall Street Journal, NPR, and on Good Morning America.

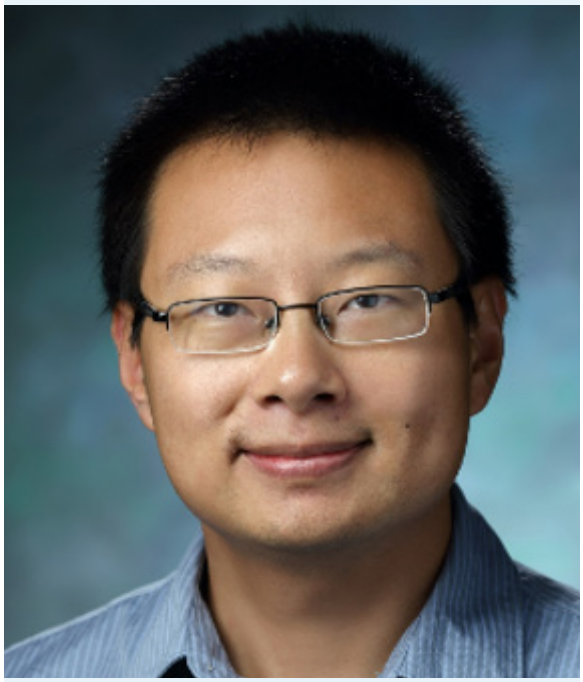
Najim Dehak, Ph.D. is the 2021 Whiting School of Engineering/HAP scholar and an Associate Professor of Electrical and Computer Engineering. He studies machine learning approaches applied to speech and multimodal processing, audio classification, and health applications. Dr. Dehak's team is developing non-invasive, artificial intelligence-based tools to detect, assess, and monitor the functional and cognitive decline in older adults. Dehak's current efforts involve the creation of AI-powered systems that utilize physiological signals to quantify and assess neuroanatomical and functional correlations that are commonly disrupted in aging adults and associated conditions such as Alzheimer's and Parkinson's diseases, frailty, and postoperative delirium. He is also a leading investigator on the Johns Hopkins Artificial Intelligence and Technology Collaboratory Pilot Core, and a co-leader of the HAP Gerotech program.

Bryan R. Hansen, PhD, MSN, RN, is the 2021 School of Nursing/HAP Scholar. He is an Assistant Professor at Johns Hopkins School of Nursing (JHSON) and Principal Faculty of the Center for Equity in Aging. He has been a passionate advocate for the promotion of optimum mental health and well-being of older adults and their families through teaching, practice, and research. He has also practiced as a psychiatric nurse, with a special focus on proactive approaches to preventing and managing aggressive behaviors in inpatient settings. He currently practices as an adult health clinical nurse specialist, collaborating and publishing inter-professionally across several areas of scholarly focus areas, including delirium, dementia, inter-professional education and practice, palliative care, and harm reduction. He co-led the Gerotech Incubator Program, where he helped facilitate the development of new technologies and ideas that improve care for older adults.

Rasika Mathias, Sc.D., is the 2021 Sarah Miller Coulson CIM/HAP Scholar. She is a Professor and Genetic Epidemiologist at Johns Hopkins Schools of Medicine and Public Health, dedicated to ending health disparities by broadening genetics studies to include diverse populations. She has a long history of important genetic discovery specific to asthma and other allergic conditions. For her HAP scholarship, she will focus on identification of genes that will help to better predict health risks among aging older adults with an emphasis on under-represented minority groups. Toward that end, she is revolutionizing the study of telomeres: the protective caps on the ends of our chromosomes that prevent our DNA from deteriorating with increasing age through novel genetics approaches. She is also applying these findings to many aging-related conditions, including frailty and cognitive decline.

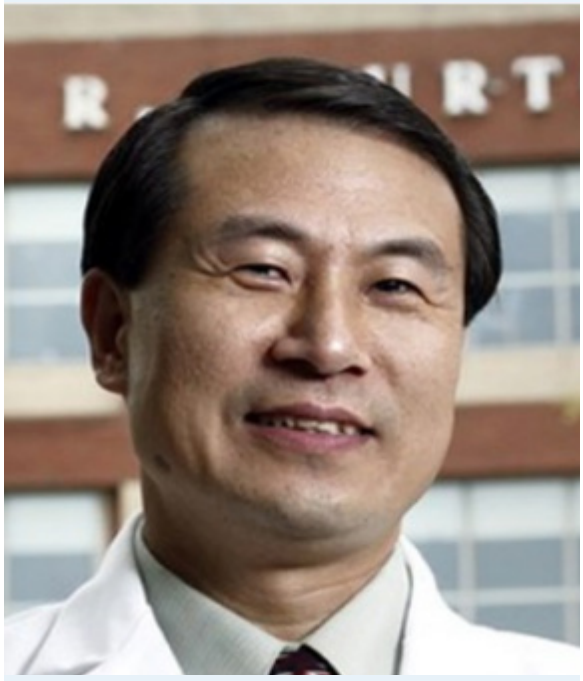
Alexander Pantelyat, M.D. is the Alafouzos Family CIM/HAP Scholar and an Associate Professor of Neurology at Johns Hopkins who focuses on Parkinson's disease and atypical parkinsonian disorders. He is also a talented violinist, who with his HAP scholarship aims to make music and rhythm an integral part of treating aging-related illnesses. He is working now with an industry sponsor to study a wearable device — a sensor on each shoe linked to a phone app with a playlist of favorite tunes — that automatically adjusts the music's tempo to the wearer's gait. The goal of this program is to give patients with Parkinson's and other aging-related conditions the opportunity to walk their way to better health at home. Pantelyat's won the 12th annual Johns Hopkins School of Medicine Outstanding Clinical Outpatient Educator Award and obtaining a NIH grant focused on developing a home-based movement and cognitive assessment platform for patients with Progressive Supranuclear Palsy.

Qinchuan Wang, Ph.D., is the Ethan and Karen Leder CIM HAP 2021 Scholar. He is an Assistant Professor in the Division of Geriatric Medicine and Gerontology at Johns Hopkins University. His research is focused on the basic molecular mechanisms underlying aging-related functional decline. Using the fruit flies as a model, he performs large-scale screening to identify genes promoting physical frailty. Using cultured cells and mice, he studies how several proteins, which have been implicated by human studies to influence physical frailty, promote functional decline. One such protein is CaMKII. Dr. Wang recently received a junior faculty grant from the American Federation for Aging Research to study the roles of CaMKII activation in aging-related sarcopenia over the next two years. He also works closely with clinical translational experts within the HAP program to identify and develop clinical uses for his discoveries.



2022

Sean X. Leng, MD, PhD, is the 2022 Salisbury Family CIM/HAP Scholar, a Geriatrician and an Immunobiologist and a Professor of Geriatric Medicine, Molecular Microbiology and Immunology in the Schools of Medicine and Public Health. He has been in the forefront of discovery related to aging-related immune remodeling and how it influences influenza and COVID-19 infections, and how it impacts immune system vaccination response in older adults. HAP support helped Dr. Leng to establish the Johns Hopkins Center on Aging and Immune Remodeling (JH CAIR) in 2022. Dr. Leng also continues to lead Hopkins' effort to promote the development of Geriatric Medicine in China and serves as President of Milstein Medical Asian American Partnership (MMAAP) Foundation. The MMAAP focuses on the development of senior healthcare and aging research in China and greater Asia.



Esther Oh, MD is the 2022 Sarah Miller Coulson CIM/HAP Scholar and an Associate Professor in the Division of Geriatric Medicine and Gerontology with joint appointments in the Departments of Psychiatry and Behavioral Sciences and Pathology at Johns Hopkins. She co-directs the Johns Hopkins Memory and Alzheimer's Treatment Center. Her research, clinical work and educational activities seek to foster targeted and personalized treatment, care, and cure for patients with memory disorders with a focus on interdisciplinary and team science approaches. She is also the Immediate Past President of the American Delirium Society and co-led United States delirium screening teams as part of the 2023 World Delirium Awareness Day (WDAD). As part of her engagement in the HAP Scholar program, she will continue important work on a program to detect delirium risk and provide physicians with delirium interventions for vulnerable patients based on machine-learning algorithms.

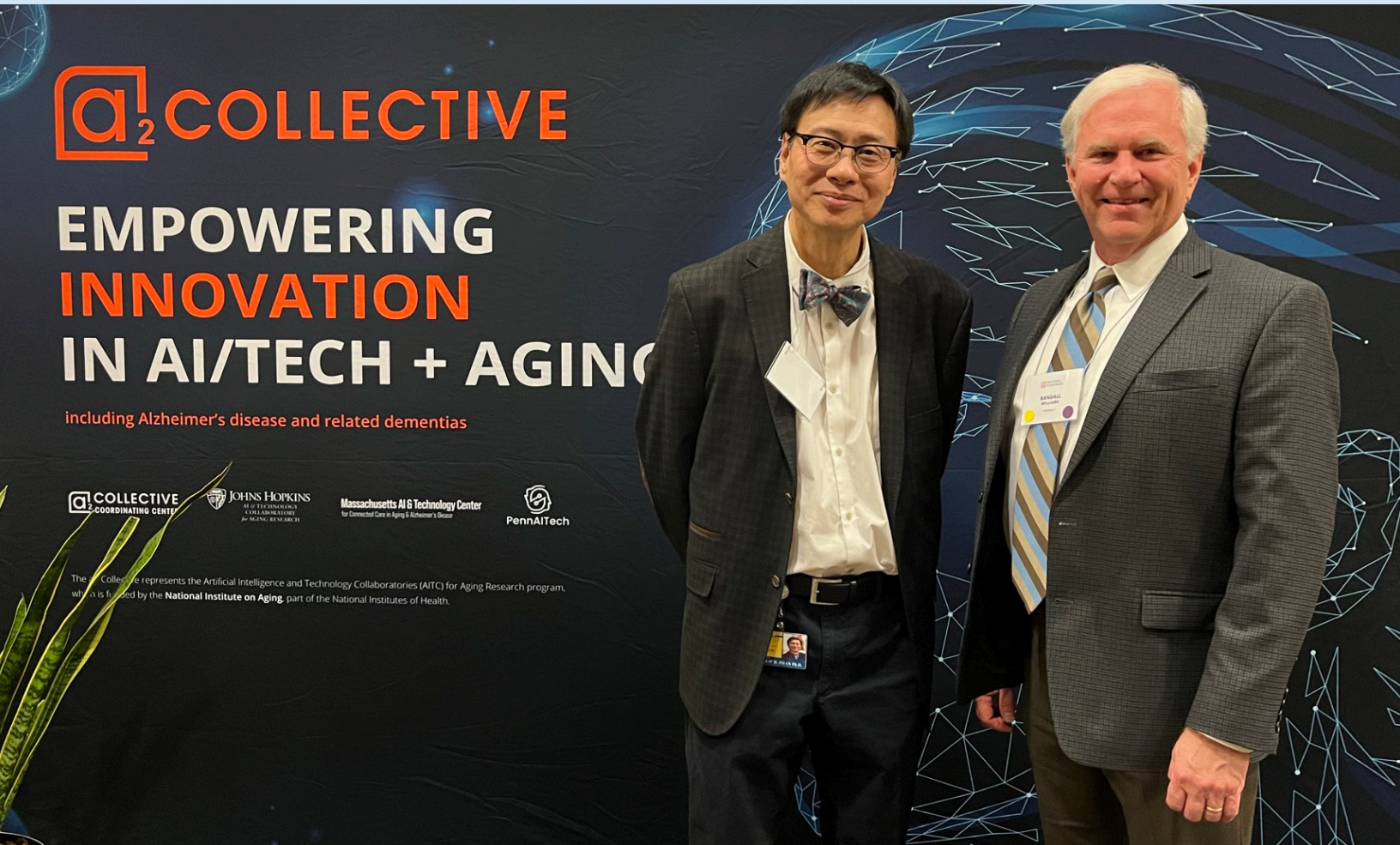
Hiromi Sesaki, Ph.D., is the 2022 Ethan and Karen Leder CIM/HAP Scholar. Dr. Sesaki is a professor in the Department of Cell Biology at Johns Hopkins University School of Medicine. His laboratory studies mitochrondria, the intracellular energy producers found in most cells. More specifically, he studies mitochondrial fusion and division and mitophagy, an intracellular recycling process thought to be dysregulated with increasing age. Overall, these dynamic mitochondrial processes integrate into major quality control mechanisms that remove mitochrondrial damage and ensure mitochondrial health and robust energy production. As part of his HAP scholar's awards, he will investigate how aging influences the mitochondrial quality control mechanism and work closely with other HAP investigators to translate his work into clinical uses related to aging and energy expenditure.

In The News

Johns Hopkins AITC National Symposium

JH AITC (Artifical Intelligence & Technology Collaboratory) hosted a national symposium on March 8, 2023 on the campus of the Johns Hopkins University School of Medicine. The event showcased the latest NIA-funded AI and technical innovations for healthy aging and provided a networking opportunity for innovators, resource providers, and strategic partners from corporations, venture capital and stakeholder organizations. The hybrid event was attended by a total of 288 people.

Phillip Phan, JH AITC Networking Core Leader and Randy Williams, WellSaid, Pilot Awardee



HAP in the Media

- *The Baltimore Sun* and *Washington Post* featured a Guest Commentary in April, 2023 by Dr. Jeremy Walston on the focus of the Human Aging Project, highlighting its unique collaborative approach: “By combining interdisciplinary investigative teams from the schools of medicine, nursing, public health, engineering and business, we are tackling some of the most challenging issues related to the care of older adults, while accelerating the delivery of solutions to those who need it most.” To read Dr. Walston’s editorial in the *Baltimore Sun*, click HERE.
- NPR focused on HAP scholar Dr. Thomas Cudjoe in a news report about the increased risk of dementia for socially isolated older adults.
  See more HERE.
- AITC PI Dr. Rama Chellappa presented for the Longevity Venture Summit on June 15, 2023 in Berkeley, California. The summit was a gathering of venture capitalists, angel investors, entrepreneurs, and corporate executives focused on the longevity economy and it attracted more than 300 leaders in the fields of aging and health. Dr. Rama Chellappa’s presentation can be viewed HERE.
- During a recent PBS News Hour, Dr. Alexander Pantelyat was interviewed about improving neurological health with the blend of science and art. View more HERE.
- Drs. Peter Abadir, Esther Oh, and Jeremy Walston held an open dialogue about the Human Aging Project and healthy aging with members of Baltimore’s Center Club in September 2022, and then at The Maryland Club in May 2023.
- Rama Chellappa, PhD was interviewed on Singularity Radio regarding his new book, *Can We Trust AI*? Listen to the interview HERE.

Rama Chellappa, PhD

Notable Grant Awards

- National Academy of Medicine Award for Frailty Research (Jude Phillip, PhD, Jeremy Walston, MD)
- Clinical Trial of Novel Drug Targeting Chronic Inflammation in Older Adults with MyMD, a local start up company
- A Glenn Foundation for Medical Research and AFAR Grant for Junior Faculty was awarded to HAP Scholar Qinchuan Wang for his project entitled, “CaMKII as a cause of age-related sarcopenia”. The project focuses on the discovery of etiology of aging-related loss of skeletal muscle function, quantity, and quality.

Philanthropy

- Individual donors have given over $6 Million for ten HAP scholars to date
- At least 2 awards have been identified for 2023 HAP scholars
- Howard Milstein Foundation continues to support HAP scholar Sean Leng, MD, PhD and JH CAIR activities

Other Notable News

- Dr. Thomas Cudjoe and colleagues were awarded a 2023 Johns Hopkins Nexus Award-Convening Award for their proposal “Convening in Our Nation’s Capital to Amplify Global Loneliness Awareness Week 2024”. This convening will be held in Washington DC at 555 Pennsylvania Avenue, the new home of the Johns Hopkins School for Advanced International Studies in the Summer of 2024.
- JH AITC Core Leader Dr. Mathias Unberath was selected to receive a Google Research Scholar Program Award to support the advancement of Mathias’ research. His proposal, “Assuring Image-based Surgical Autonomy with Human-in-the-loop Designs,” aims to improve our understanding of image-based surgical navigation systems through explainable machine learning techniques to better understand how users interact with complex information.
- Dr. Lolita Nidadavola, a clinician scientist in the Division of Geriatric Medicine and Gerontology, was awarded a Spring 2023 Clinician Scientist Award for her project titled “Microglial Responses to Cell-free DNA in Alzheimer’s Disease. Mentors for Dr. Nidadavolu’s Clinician Scientist Award include HAP Scholars Drs. Esther Oh and Peter Abadir.

Thank you.

Please partner with us and consider making a donation HERE.