



HMRI LEADS THE WAY



SCIENTIFIC
DISCOVERY,
MADE IN
PASADENA



HMRI | Huntington
Medical Research
Institutes

2023 ANNUAL REPORT

MISSION

HMRI advances scientific discovery through innovative biomedical research to improve health outcomes and inspire the next generation of scientists.

VISION

By 2032, HMRI will be one of the leading independent biomedical research organizations in the United States by linking our scientific discoveries with improvements in human health.

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A Message from our President and CEO and Board Chair



Julia E. Bradsher, PhD, MBA and Susan E. Kane, PhD

HMRI's vision of becoming a leading independent biomedical research organization in the United States is driven by its culture of innovation, embodying focused, revolutionary research that generates solutions to complex diseases of the heart and brain.

In September 2022, the board approved a new three-year strategic plan for FY2023 – FY2025 focused on thriving, scaling, and sustaining HMRI to achieve its vision within 10 years, linking scientific discoveries to improvements in human health. As part of this plan, the mission statement was updated to succinctly articulate HMRI's legacy of innovation aimed at improving health outcomes, and for the first time, it included HMRI's longstanding intention to inspire and educate the next generation of scientists. The board, leadership, and staff are committed to working toward HMRI's vision by embracing its organizational values: innovating with creativity, collaborating for the greater good, operating with integrity and rigor, working with respect, and acting with accountability to provide leadership in the biomedical industry and forge new paths.

HMRI is uniquely positioned as an emerging leader in Pasadena's growing biotech and life sciences ecosystem. The city's tradition of intellectual excellence—shaped by institutions like Caltech and the NASA Jet Propulsion Laboratory, as well as HMRI—provides a foundation for this ecosystem. This foundation enables HMRI to build upon its track record of innovation, incubate biotech start-ups and form strategic partnerships, vital to commercialize treatments, tools and technologies, ultimately benefiting people around the world. Additionally, these collaborations open new doors for postdoctoral and advanced student researchers in our education programs to gain experience translating scientific discoveries into marketable products that advance human health.

Reflecting back, HMRI gratefully acknowledges the years of dedication and research contributions from the colorectal research team, led by Howard S. Kaufman, MD, and the liver researchers, led by Myron J. Tong, MD, PhD.

As HMRI progresses and grows, embarking on new opportunities to achieve its bold vision, we express our deepest gratitude to you. Thank you for your support and shared dedication to improving human health and educating the next generation of scientists.

Julia E. Bradsher, PhD, MBA
President and CEO

Susan E. Kane, PhD
Board Chair

Board of Directors 2023

Susan E. Kane, Board Chair
John Babcock, Vice Chair
James D. Gamb,
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Cameron Boswell
C. Joseph Chang
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Terry Perucca
Sandra B. Sharp
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Sonia Singla
William E. Thomson
Rick Wentzel

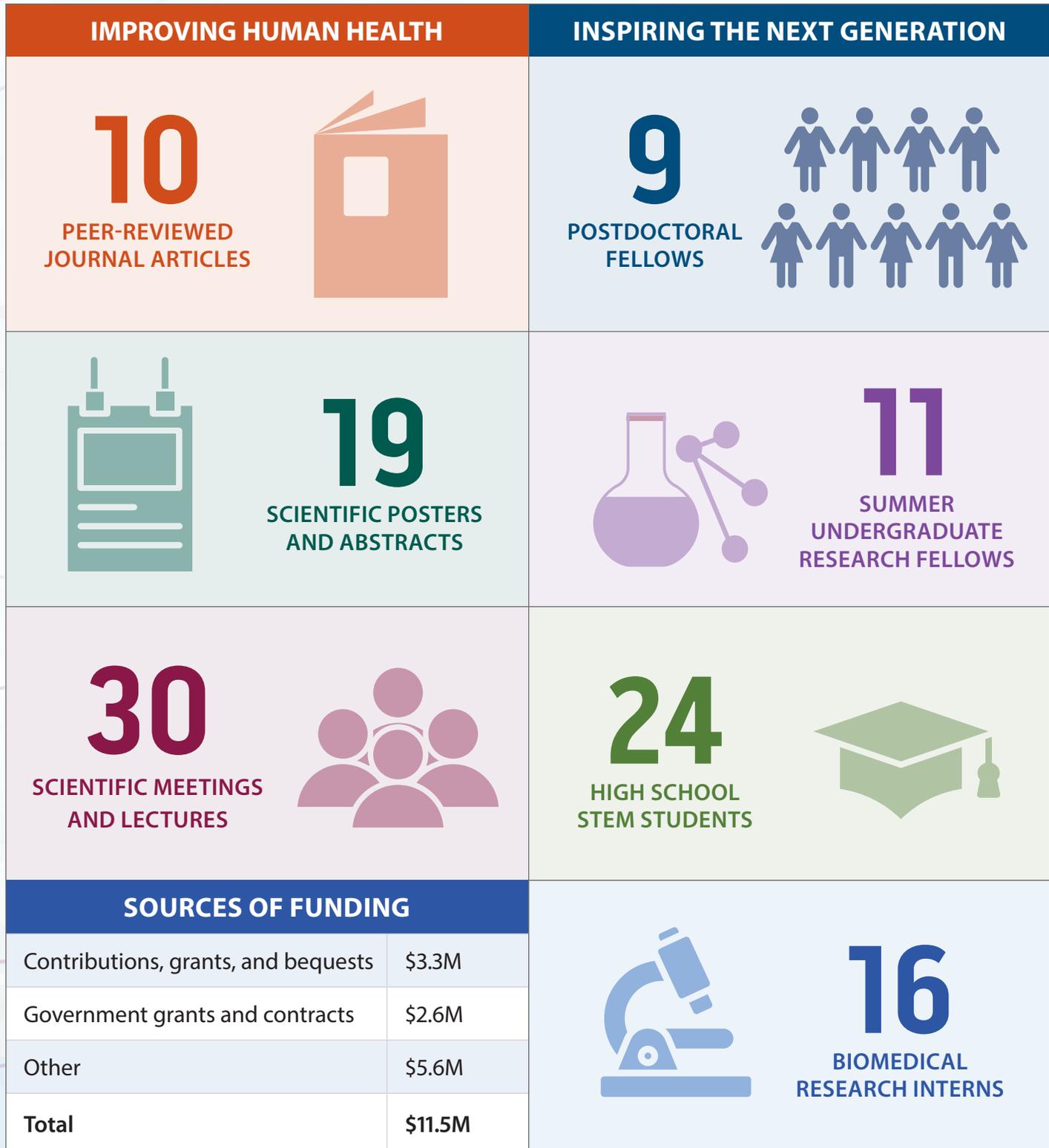
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Michael C. Doyle
Jerry M. Harrington
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R. William Johnston
George D. Leal

In Memoriam Emeritus Directors 2023

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Lary J. Mielke
Lynn H. Myers
Robert Tranquada

Scientific Discovery & Biomedical Innovation



CARDIOVASCULAR

Marijuana and electronic cigarettes on cardiac arrhythmias

Kloner RA

Heart Rhythm, November 2022

One acute exposure to e-cigarette smoke using various heating elements and power levels induces pulmonary inflammation

Shi J, Dai W, Chavez J, Carreno J, Zhao L, Kleinman MT, Arechavala RJ, Hasen I, Ting A, Bliss B, Monterrosa Mena JE, Kloner RA

Cardiology Research, December 2022

Effect of phosphodiesterase type 5 inhibitors on major adverse cardiovascular events and overall mortality in a large nationwide cohort of men with erectile dysfunction and cardiovascular risk factors: A retrospective, observational study based on healthcare claims and national death index data

Kloner RA, Stanek E, Crowe CL, Singhal M, Pepe RS, Bradsher J, Rosen RC

Journal of Sexual Medicine, January 2023

Effects of electronic cigarette exposure on myocardial infarction and no-reflow, and cardiac function in a rat model

Dai W, Shi J, Siddarth P, Zhao L, Carreno J, Kleinman MT, Herman DA, Arechavala RJ, Rensch S, Hasen I, Ting A, Kloner RA

Journal of Cardiovascular Pharmacology and Therapeutics, January 2023

Invasive versus conservative management in coronary artery disease

Rezkalla SH, Kloner RA

Clinical Medicine and Research, June 2023

NEUROSCIENCES

Nutritional metabolism and cerebral bioenergetics in Alzheimer's disease and related dementias

Yassine HN, Self W, Kerman BE, Santoni G, Navalpur Shanmugam N, Abdullah L, Golden LR, Fonteh AN, Harrington MG, Gräff J, Gibson GE, Kalaria R, Luchsinger JA, Feldman HH, Swerdlow RH, Johnson LA, Albeni BC, Zlokovic BV, Tanzi R, Cunnane S, Samieri C, Scarmeas N, Bowman GL

Alzheimer's & Dementia, December 2022

The connection between heart rate variability (HRV), neurological health, and cognition: A literature review

Arakaki X, Arechavala RJ, Choy EH, Bautista J, Bliss B, Molloy C, Wu DA, Shimojo S, Jiang Y, Kleinman MT, Kloner RA

Frontiers of Neuroscience, March 2023

Associations of ApoE4 status and DHA supplementation on plasma and CSF lipid profiles and entorhinal cortex thickness

Bantugan MA, Xian H, Solomon V, Lee M, Cai Z, Wang S, Duro MV, Kerman BE, Fonteh A, Meuret C, Li M, Braskie MN, McIntire LBJ, Jurin L, Oberlin S, Evans J, Davis R, Mack WJ, Abdullah L, Yassine HN

Journal of Lipid Research, June 2023

Resting heart rate (variability) and cognition relationships reveal cognitively healthy individuals with pathological amyloid/tau ratio

Molloy C, Choy EH, Arechavala RJ, Buennagel D, Nolty A, Spezzaferri MR, Sin C, Rising S, Yu J, Al-Ezzi A, Kleinman MT, Kloner RA, Arakaki X

Frontiers in Epidemiology, May 2023

D-serine availability modulates prefrontal cortex inhibitory interneuron development and circuit maturation

Folorunso OO, Brown SE, Baruah J, Harvey TL, Jami SA, Radziszewsky I, Wolosker H, McNally JM, Gray JA, Vasudevan A, Balu DT

Scientific Reports, June 2023

HMRI RESEARCHERS

CARDIOVASCULAR RESEARCH

Robert A. Kloner, MD, PhD

Chief Science Officer,
 Chair, Cardiovascular Research

Wangde Dai, MD

Research Associate Professor,
 Cardiovascular Research

Jinru Shi, PhD

Research Associate Professor,
 Cardiovascular Research

CARDIOVASCULAR SIGNALING

Nicole H. Purcell, PhD

Scientific Director, Education Programs
 Associate Professor, Cardiovascular Research

NEURO-CARDIO- IMMUNOLOGY

Abdala Elkhail, PhD

Assistant Professor, Immunology

NEUROSCIENCES

Anju Vasudevan, PhD

Chair and Scientific Director,
 Department of Neurosciences
 Associate Professor,
 Neuroscience Research

Xianghong Arakaki, MD, PhD

Assistant Professor, Neuroscience Research

Alfred N. Fonteh, PhD

Research Associate Professor,
 Neuroscience Research

COLORECTAL RESEARCH

Howard S. Kaufman, MD

Clinical Professor and Clinical Director,
 Colorectal Research

LIVER RESEARCH

Myron J. Tong, MD, PhD

Clinical Professor and Clinical Director,
 Liver Center

Advancements in Biomedical Research of the Heart and Brain

Robert A. Kloner, MD, PhD
*Chief Science Officer,
Chair, Cardiovascular Research*



Scientists at HMRI made notable progress in 2023, advancing scientific discovery in cardiovascular and neurosciences research.

They published 10 peer-reviewed journal articles, presented 19 scientific posters and abstracts, and gave 30 scientific lectures. In January 2023, HMRI established the Analytical Biochemistry Core Laboratory, a shared key resource to aid investigators in advanced quantification and analysis of biochemical compounds. HMRI strategically expanded the breadth of research with the addition of the neuro-cardio-immunology laboratory. This new complementary area of exploration, led by Abdala Elkhail, PhD, assistant professor of immunology, will provide new insights into HMRI's investigation of the vital connection between the heart and brain.

Cardiovascular Research



Twenty-five years after Viagra hit the market, a group of 17 interdisciplinary scientists and practitioners convened at Princeton IV, held at HMRI on March 10, 2023. They examined the intersection of cardiovascular disease (CVD) and sexual health, to readdress the cardiovascular workup of men presenting with erectile dysfunction (ED) and known CVD or risk factors for CVD.

In a landmark retrospective study, scientists examined the impact of ED drugs on major adverse cardiovascular events (MACE) by analyzing the health records of more than 70,000 men with ED. According to this milestone study, published in the *Journal of Sexual Medicine (JSM)*, men who took Viagra, Cialis, Levitra, and other drugs in the same class for ED experienced 13% lower rates of MACE, including lower rates of heart failure and death due to heart disease, and a 25% decrease in all-cause mortality compared to men with ED not exposed to these drugs. Results raise the possibility that PDE-5 inhibitors may have cardioprotective effects. Large-scale prospective, placebo-controlled, randomized clinical

trials are needed. JSM named this “the best male sexual medicine paper of 2023.”

HMRI's cardiovascular researchers continued studying the effect of E-cigarette exposure with collaborators at UC Irvine. Researchers showed that one acute exposure caused lung inflammation in preclinical models. Findings did not show an increased risk of heart attack; however, body weight decreased, the left ventricle increased in weight and thickness, blood vessels stiffened, and other aspects of diminished cardiac function were observed.

Nicole H. Purcell, associate professor of cardiovascular research and head of the Cardiovascular Signaling Research Lab, was awarded a grant in June 2023 from the Saving Tiny Hearts Society. They fund unique, early-stage science that fosters the next generation of congenital heart defects research. Purcell's team was selected by the Saving Tiny Hearts Society Medical Advisory Board to investigate “The effect of nicotine on PHLPP isoforms in the adolescent heart.”

Purcell was a reviewer on numerous National Institutes of Health study sections. She also served in scientific leadership positions to further STEM education and cardiovascular research, including Chair of the Blair High School Health Career Academy Advisory Board, Chair of the American Heart Association Basic Cardiovascular Sciences Communications Committee, and Vice Chair of the North American Section - International Society for Heart Research Mid-career Investigator Committee.

Neurosciences



Anju Vasudevan, PhD, chair and scientific director, Department of Neurosciences, was published in *Scientific Reports* for “D-serine availability modulates prefrontal cortex inhibitory interneuron development and circuit maturation.” Vasudevan provided her expertise on GABAergic signaling and brain development for this work. The study demonstrated that the availability of D-serine,

a naturally occurring amino acid, is essential for prenatal cortical interneuron (CIN) development and postnatal cortical circuit maturation, and that glutamate contributes to CIN development via *N*-methyl-d-aspartate receptors (NMDARs). Furthermore, the team showed that Serinen Racemase (SR) deficiency results in GABAergic dysfunction through a loss of GABAergic synapses. Additional studies will aim to determine the specific impact of SR deletion in CIN progenitor cells on interneuron density, inhibitory synapses, and excitatory/inhibitory (E/I) balance. The clinical implications of these findings are that NMDAR hypofunction due to reduced co-agonist availability may contribute to the pathophysiology of neurodevelopmental disorders characterized by interneuron dysfunction.



In August, Vasudevan received an S10 instrumentation grant award from the National Institutes of Health (NIH), used to purchase the Keyence BZ-X800 all-in-one fluorescence microscope. This shared resource will be dedicated to NIH-funded projects aimed at the evaluation of brain and heart pathology and uncovering new treatment strategies for patients. It will facilitate HMRI's research at unprecedented speeds, and forge new avenues for understanding and treating psychiatric, neurological, and heart diseases.

Vasudevan is a leading global expert and pioneer in the developing field of neurovascular research. She was invited to speak on the vascular origins and therapies for neuropsychiatric disorders at the European Molecular Biology Laboratory Symposium—The Neurovascular Interface Neuroforum in Heidelberg, Germany (November 2022), and at the Neuroscience and Brain Disorders Forum in Valencia, Spain (April 2023).

Alfred N. Fonteh, PhD, research associate professor of neuroscience research and head of the Biomarker Neuro-disease Mechanism Laboratory, completed the design and optimization of methods for detecting Alzheimer's disease (AD) biomarkers in urine using Liquid Chromatography-Mass Spectrometry (LC-MS/MS) and initiated methods for detecting AD biomarkers in plasma. These include dicarboxylic acids for urine biomarker studies, monocarboxylic acids for urine and plasma biomarker studies, short-chain fatty acids for detecting the role of the microbiome in AD, and odd-chain saturated fatty acids associated with the increased phosphor-tau content in AD. These methods will be applied to the Brain Aging Study control and AD samples to reproduce previous studies performed by Gas Chromatography-Mass Spectrometry (GC-MS).

Fonteh was published in the journal *Alzheimer's & Dementia* for his contribution to "Nutritional metabolism and cerebral bioenergetics in Alzheimer's disease and related dementias." The study focused on leading mechanisms of cerebral bioenergetic breakdown in the aging brain at the cellular level, as well as the causes and impact of disturbed bioenergetics, particularly at the blood-brain barrier. This has important implications for nutrient delivery to the brain delivery and nutritional interventions.

Xianghong Arakaki, MD, PhD, assistant professor of neuroscience research and head of the Cognition and Brain Integration Laboratory, investigated the vital link between the heart and the brain in studies investigating heart rate variability (HRV). "Resting heart rate (variability) and cognition relationships reveal cognitively healthy individuals with pathological amyloid/tau ratio," published in *Frontiers in Epidemiology*, found dysfunctional heart-brain connections were revealed in those with a high risk of cognitive decline. "The connection between HRV, neurological health, and cognition: A literature review," published in *Frontiers in Neuroscience*, found that HRV acts as a proxy of autonomic activity and is associated with executive function, decision-making, and emotional regulation in our health and well-being. ❖

Robert A. Kloner

Robert A. Kloner, MD, PhD
Chief Science Officer, Chair and Scientific Director,
Cardiovascular Research



The Analytical Biochemistry Core Laboratory (ABC)

was established in January 2023 to foster growth and scalability at HMRI, enhancing focused research and innovation. This shared resource supports researchers with analytical methodologies using advanced detection systems for the identification, characterization, and quantification of compounds and their interactions.

As a well-equipped testing facility with state-of-the-art instrumentation, the ABC lab uses electrochemiluminescence platforms (MSD), chromatography systems, spectrophotometry analyzers, and sample preparation equipment to execute various techniques in biological and synthetic matrices. Key 2023 purchases include:

- **Quadrupole Mass Spectrometer, Thermo Vanquish Neo UHPLC system with TSQ Altis Plus Triple Quadrupole Mass Spectrometer (UHPLC MS-MS system)**, used by the ABC and Biomarkers and Neurodisease Mechanism laboratories (BNML). This instrument is used to develop new methods for biomarker research and offers enhanced sensitivity and accuracy of trace/ultra-trace level analysis.

- **Thermo Dionex ICS-6000 HPIC System**, used by ABC, BNML, and Cognition and Brain Integration laboratories. This instrumentation is used in qualitative and quantitative analysis of anions and cations for bioanalysis.

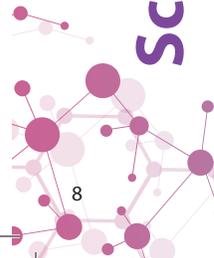
ABC implemented and optimized analytical methods for the characterization of 12+ biomarker-matrix combinations (6 analytes in 2-3 sample matrices) and processed 6000 samples for the Brain Aging Study. In support of migraine and stroke preclinical and translational research, analytical methods were optimized to characterize an additional eight compounds and their interactions across 5+ matrices. At least 1500 samples were tested to support these studies in 2023. The volume of data produced by the ABC makes it possible to scale the research and experimentation at HMRI.



Under Natalie Astraea's direction, the Analytical Biochemistry Core provides collaborative services such as method development, optimization and validation, as well as complete testing services. From project inception through data verification, ABC prioritizes safety, quality, and efficiency, allowing researchers to focus on scientific discovery and a sustainable culture of innovation.❖



Scaling Scientific Discovery and Innovation



New insights into immunology broadens scientific discovery at HMRI

Abdala Elkhal, PhD joins HMRI to lead the Neuro-Cardio- Immunology Lab



HMRI strategically added the Neuro-Cardio-Immunology Lab in 2023, led by Abdala Elkhal, PhD, assistant professor of immunology.

This highly synergistic and complementary area of research expands the breadth of HMRI's scientific discovery into the vital connection between the heart and brain. Immunology has implications for HMRI's existing programs that research neurodevelopment, neurodegenerative diseases, cardiovascular pathogenesis, and cardiovascular molecular mechanisms.

Elkhal's research primarily focuses on the role of the naturally occurring coenzyme Nicotinamide adenine dinucleotide (NAD⁺), which is present in all living organisms and central to energy metabolism. A decade ago, he made a ground-breaking observation in preclinical trials – NAD⁺ exhibited significant potential as a therapy for individuals suffering from autoimmune disorders, bacterial infections, and organ transplantation.



Abdala Elkhal, PhD, played a crucial role in the success of postdoctoral fellow Amina Ghouzlani, PhD, and the 2023 summer SURF students under his mentorship in the newly formed Neuro-Cardio- Immunology Laboratory.

Born and raised in France, Elkhal pursued doctoral research in Germany and obtained a PhD in cell biology and biochemistry from the University Rene Descartes Paris V in France. During his postdoctoral studies at Boston Children's Hospital/Harvard Medical School, he shifted his research to immunology.

While serving on the faculty of Harvard Medical School, Elkhal initiated his pioneering work on NAD⁺. "We demonstrated that NAD⁺ regulates the immune system and facilitates the transformation of aggressive T-cells into protective ones," stated Elkhal. This effect was observed even in individuals with immunodeficiency. In preclinical trials, Elkhal found that administering NAD⁺ provided protection against septic shock induced by bacteria like *E. coli*. Additionally, NAD⁺ not only impeded the progression of the autoimmune disease multiple sclerosis but also reversed its advance.

When he arrived at HMRI, Elkhal connected NAD⁺ to the institutes' research on the heart and brain. He collaborated with Anju Vasudevan, PhD, chair and scientific director of HMRI's Department of Neurosciences, to investigate the impact of NAD⁺ on prenatal brain development. In preclinical models, they discovered that NAD⁺ can repair flawed blood vessel formation in the embryonic forebrain, preventing abnormal behavioral symptoms after birth. These findings suggest that NAD⁺ could be used in the future as a prenatal supplement to safeguard against neurological disorders.

Together with Robert A. Kloner, MD, PhD, chair of cardiovascular research at HMRI, Elkhal explored the potential of NAD⁺ as a therapeutic intervention for patients recovering from heart attacks and for minimizing excessive bleeding following major injuries.

Elkhal says, "My goals are to discover new treatments for patients suffering from chronic illnesses and to advance NAD⁺ into clinical trials." ❖



HMRI's tradition of excellence in scientific education continues

Educating the next generation of outstanding leaders in science, research, and medicine is a long-standing tradition and strategic pillar that began at HMRI over 50 years ago.



The life sciences industry is vital to future advancements in human health and to the US economy, which contributed \$2.9 trillion in economic output in 2021. California institutions receive more National Institutes of Health (NIH) and National Science Foundation (NSF) funding than any other US state, driving innovation and growth. According to the Life Science Economic Impact Report from Biocom California, the life science industry in California supports 1.24 million jobs, \$128.6 billion in labor and sole proprietor income, and \$414.2 billion in economic output. Every job directly supported by life science generates more than 1.7 additional jobs for the state economy.

As a biosciences leader, HMRI is committed to educating future generations of scientists, a crucial contribution to a vibrant and sustainable life sciences ecosystem. The aim of HMRI's education program is to recruit and educate the brightest, intellectually curious students with diverse backgrounds, experiences, and perspectives. In 2023, HMRI offered four education programs: the postdoctoral fellowship program, Summer Undergraduate Research Fellowship (SURF), high school STEM program, and year-round biomedical research internship program.

The postdoctoral fellowship is the flagship of HMRI's education strategy, allowing fellows to extend and deepen their technical abilities in their chosen doctoral fields. Postdoctoral fellows are encouraged to produce lead or single-author publications, advancing toward future professional attainment.

Since the inception of the Summer Undergraduate Research Fellowship over 45 years ago, approximately 600 students have benefited from the program. In recent years, under the leadership of Nicole Purcell, PhD, Scientific Director of Education at HMRI, the SURF program evolved to create a more structured eight—to ten-week mentored research experience, whereby students learn the daily workings of a research lab and fine-tune practical laboratory techniques. In addition to participating in scientific seminars and discussions, students present their research findings at the program's commencement. Research options include Alzheimer's disease and other dementias, migraine, neurodevelopmental disorders, cardiovascular, cardiovascular signaling, and neuro-cardio-immunology.

The STEM program began in 2021 to enhance the laboratory experience of rising juniors and seniors attending high school in the Pasadena Unified School District who are interested in STEM careers. The six-week program includes research methods, instrumentation, and safety; anatomy of the heart, brain, and lungs; pathology and radiology; genetics; environmental science; and a symposium to present research topics. In breakout sessions, students receive mentorship on college and various pathways into STEM careers.❖

2023 HMRI POSTDOCTORAL FELLOWS

Abdulahakim Al-Ezzi, PhD

Faculty mentor: Xianghong Arakaki, MD, PhD
Neurosciences – Cognition Lab

Tanimul Alam, PhD

Faculty mentor: Nicole Purcell, PhD
Cardiovascular – Cardiovascular Signaling Lab

Divya Desai, PhD

Faculty mentor: Anju Vasudevan, PhD
Neurosciences – Angiogenesis and Brain Development Lab

Amina Ghouzlani, PhD

Faculty mentor: Abdala Elkhail, PhD
Neuro-Cardio-Immunology Lab

Kazi Helal Hossain, PhD

Faculty mentor: Anju Vasudevan, PhD
Neurosciences – Angiogenesis and Brain Development Lab

Joby Jose, PhD

Faculty mentor: Alfred Fonteh, PhD
Neurosciences – Biomarker and Neurodisease Mechanism Lab

Divya Mishra, PhD

Faculty mentor: Anju Vasudevan, PhD
Neurosciences – Angiogenesis and Brain Development Lab

Khaja Shameem Mohammed Abdul, PhD

Faculty mentor: Nicole Purcell, PhD
Cardiovascular – Cardiovascular Signaling Lab

Chenchen Xai, PhD

Faculty mentor: Xianghong Arakaki, MD, PhD
Neurosciences – Cognition Lab (Migraine)



Career development is an integral part of HMRI's education programs. In 2023, postdoctoral fellows and SURF students attended a career development workshop led by career coach and leadership consultant Yanira Guzman.

2023 SUMMER UNDERGRADUATE RESEARCH FELLOWS (SURF)

Cardiovascular Signaling

Aaron Alog, Mt. San Antonio College
 Robert Liu, University of California, Berkeley
 Jerry Salinas, California State University, Dominguez Hills

Neurosciences

Emily Abad, Pasadena Community College
 Michael Bailey, Maryville College
 Melanie Ly, Mt. San Antonio College
 Ashanti Miller, Howard University
 Yzabella Ragaza, Pasadena Community College

Neuro-Cardio-Immunology

Zarah Faltin, California State University, Dominguez Hills
 Thu (Amy) Nguyen, Mt. San Antonio College
 Ashley Pacheco, Grinnell College



2023 SURF cohort and biomedical research interns embark on their summer programs, led by faculty mentors and postdoctoral fellows.

2023 SUMMER HIGH SCHOOL STEM STUDENTS



High school STEM students gathered at the commencement of the 2023 summer program to present their scientific research projects to their families and mentors.

Jacqueline Fonesca, High School STEM Teacher
 Baxton Chen, TA; Camilla Connor, TA

Blair High School

Zoe Jeronimo
 Paulina Kuznecovas
 Amy Marin
 Emmerson Tucker
 Marissa Valdez

CIS Academy

Aurora Cervantes
 Jasmine Cervantes

John Muir High School

Valentina Huizar
 Mia Rodriguez

Marshall Fundamental School

Alexis Benitez
 Melanie Duarte
 Kenneth Garnett
 Tram Hoang-Le
 Megan Pranboonpluk
 Alique Tufenkjian

Pasadena High School

Johnny Balogh
 Luna Hernandez
 Yeonho Jeong
 Cheyanna Lopez
 Isabella Lopez
 Iyanna Pugh
 Alexis Rojas
 Mia Smith
 Eunchong Yang

Susan Kane HMRI Supporter Spotlight

Susan Kane, PhD and her husband of 27 years, Jon Fuhrman, have long been dedicated Pasadena residents, serving in civic and community affairs.

Jon, a retired computer scientist, has worked professionally in computer information systems and has been politically active locally and nationally for over 50 years. Kane spent most of her career at City of Hope (COH), where she worked as a cancer researcher and held several academic positions. Notably, she was the first woman chair of a COH research department, the architect and founding director of COH's training program in breast cancer research, and she oversaw all COH educational programs for a time.

Kane and Fuhrman were not exposed to philanthropy during their formative years, but both learned the value of community involvement from an early age and are now critical players advancing nonprofit initiatives in Pasadena. "Our greatest impact comes from service and giving of our time to causes and organizations that align with our personal values," said Fuhrman.

Kane was invited to serve on HMRI's Board of Directors in 2015 after a recommendation from former HMRI board member Jim Gamb, who served with Kane on other community boards. As a scientist, educator, and advocate, she was a natural fit for the role and well-aligned to HMRI's mission. In 2019, she was appointed Vice Chair, and in 2022 – 2023, Kane proudly became HMRI's first woman board Chair. Few women were on HMRI's board when she joined almost a decade ago. "We recognized the importance of bringing different perspectives to the table," said Kane. "We've come a long way in diversifying board membership since then."

In her career as a scientist, Kane observed disparities among women colleagues - underrepresented as their career ladders progressed due to family demands, discrimination, and competition. Currently, women account for 34% of the STEM workforce. However, HMRI is at the forefront of change - women represent 46% of the organization's staff and 41% of its leadership. Kane is grateful to see progress and eager to continue supporting future generations of women in STEM. Twenty-five years ago, Kane founded STEM Savvy in conjunction with the American Association of University Women (AAUW). This program exposes local middle school girls to science experiences and career paths at a critical juncture when their interest and confidence in science decline. Each year, the event is held at Pasadena City College, led by faculty and women in STEM careers.



Susan and Jon at HMRI's annual Evening of Gratitude.

In addition to advancing women in STEM, Kane's passion extends to creating equity in the STEM workforce and research. "Susan's passion for STEM runs deep," said Kane's longtime colleague Jamil Momand, PhD, professor of biochemistry at Cal State LA. "I learned that she really cares about giving opportunities to students and faculty who don't typically have access to state-of-the-art research and who are not familiar with how to apply for funding."

While she was at COH, Kane spearheaded a training program to address minority disparities in cancer research, a crucial initiative that aimed to include more underrepresented groups in research. "Diversity is vital to progress, and it comes from the voices of lived experiences, exposure to various health issues, and unique perspectives," said Kane. She also facilitated a collaboration between COH and Duarte Unified School District to teach complex scientific subjects and inquiry to students in grades 2, 5, 8, and high school, furthering her commitment to inspiring and educating future generations of scientists.

To further support local STEM students, Kane and Fuhrman are part of a new nonprofit called First Generation Scholarship Fund. Eligible first-generation community college STEM students transferring to a four-year university receive financial assistance, enabling them to graduate on time and debt-free. Additionally, Kane and Fuhrman established a fund for PCC students, primarily women, to complete paid summer internships at local research institutes, including HMRI. "HMRI provides an exceptional hands-on laboratory experience with personalized mentorship," said Kane. "This equips students with valuable skills to advance in their careers and educational pursuits."

HMRI is grateful for Kane's leadership and her service on a visionary board, instrumental in transforming HMRI into a robust research institute poised for scientific growth. Their strategic initiatives, new state-of-the-art research facilities, and a firm commitment to scientific education, have left an indelible mark on the institute's trajectory and the greater Pasadena community. ❖

HMRI Strengthens Local Biosciences Industry

HMRI's growth and success in developing biomedical innovations have always been intertwined with the vibrancy of the research environment in Pasadena. HMRI was born from the co-existence of several medical research institutes in the city from the 1950s through the 1980s. This collaborative environment contributed to HMRI discoveries—such as using lasers to remove tumors and magnetic resonance imaging for medical diagnosis—that have enabled people to live longer, healthier lives.

“Collaboration is the key to our success. Our scientists will benefit from collaborators in the biotech industry who can help us flesh out basic science and translate it into clinical science,” stated HMRI President and CEO, Julia Bradsher, PhD, MBA. “By partnering with industry, we create a channel for our innovations to go from bench to bedside—from discovery to testing to trying therapies out on patients and, ultimately, to the marketplace.”

Today, HMRI is playing a key role in an effort coordinated by the City of Pasadena's Economic Development Division to strengthen and grow the local bioscience industry.



Robert Kloner, left, and Julia Bradsher, right, lead the Bio Cluster Expansion Tour of HMRI's state-of-the-art facilities.

On May 18, 2023, HMRI was featured as part of Pasadena's Bio Cluster Expansion Tour of leading bioscience institutions. “Pasadena is becoming one of the most notable bioscience industry hubs in the region,” said Pasadena Mayor Victor Gordo. “It is our priority to promote bioscience and help businesses find a home where they can innovate, grow and access our diverse and talented workforce. We continue to invest in transit and workforce development to connect workers to high-quality bioscience jobs. We are learning from and partnering with local industry leaders like Huntington Medical Research Institutes, and taking a proactive approach to ensuring bioscience thrives in Pasadena.”

HMRI is working closely with the city to help put the right policies in place. For example, HMRI is located in Pasadena's HeArt District, which stands for health, education, arts, research and technology. Besides HMRI, the district includes Huntington Hospital and the Art Center College of Design's South Campus. Last October, the city approved the South Fair Oaks Specific Plan, which includes zoning adjustments for the HeArt District. HMRI attended city council meetings regarding the plan's development and advocated for zoning regulations to make this district a place where life sciences companies can thrive.

It will take time to build this ecosystem. For instance, although Pasadena has vacant commercial real estate, the vacancy rate for lab space is less than 1%. Biotech companies need space to grow. At HMRI, we facilitate collaboration. As the campus develops, it can provide additional space for biotech companies to innovate and grow. HMRI's goal is to create a culture of innovation not only amidst HMRI scientists but also among our life sciences community partners. ❖

STATEMENT OF FINANCIAL POSITION

	Sept 30 2023	Sept 30 2022
ASSETS		
Cash	613,872	4,686,352
Government and contract receivables	194,225	234,945
Other receivables, net	703,299	385,085
Promises to give, net	2,148,099	4,922,760
Prepaid expenses	130,384	147,917
Investments	31,540,075	27,343,142
Property and equipment, net	30,810,177	32,165,263
Patents, net	208,991	205,420
Total Assets	66,349,122	70,090,884
LIABILITIES AND NET ASSETS		
Liabilities		
Accounts payable	340,624	408,464
Accrued expenses	462,251	1,064,704
Refundable advance	-	3,634
Accrued pension cost	1,317,307	636,560
Total Liabilities	2,120,182	2,113,362
Net Assets		
Net assets without donor restrictions		
Undesignated	25,519,950	30,809,350
Designated by the Board	17,180,184	14,067,676
Total Net Assets Without Donor Restrictions	42,700,134	44,877,026
Net assets with donor restrictions	21,528,806	23,100,496
Total Net Assets	64,228,940	67,977,522
Total Liabilities and Net Assets	66,349,122	\$ 70,090,884

	Without Donor Restrictions	With Donor Restrictions	Sept 30 2023	Sept 30 2022
REVENUE, SUPPORT, AND GAINS				
Contributions, grants, and bequests	1,713,808	1,631,841	3,345,649	2,971,836
Investment return utilized for operations	2,019,731	1,171,634	3,191,365	3,584,499
Government grants and contracts	2,630,226		2,630,226	2,903,198
Employee retention credit	1,503,061		1,503,061	
Clinical and royalty income	408,978		408,978	1,177,135
Rental income	178,816		178,816	194,316
Gain on sale of property and equipment			-	
Partnership (loss)	227,605		227,605	(272,223)
Net assets released from restrictions	4,827,027	(4,827,027)		
Total Revenue, Support, and Gains	13,509,252	(2,023,552)	11,485,700	10,558,761
EXPENSES				
Program services	9,680,808		9,680,808	8,409,288
Supporting services				
Management and general	3,971,962		3,971,962	4,542,147
Fundraising	961,067		961,067	639,471
Total supporting services	4,933,029	-	4,933,029	5,181,618
Total expenses	14,613,837	-	14,613,837	13,590,906
Change in Net Assets from Operations	(1,104,585)	(2,023,552)	(3,128,137)	(3,032,145)
NET INVESTMENT RETURN				
Unrealized losses on investments	690,499	580,594	1,271,093	(7,445,081)
Realized gains on investments	499,296	272,588	771,884	737,702
Interest and dividends	457,362	782,453	1,239,815	1,407,330
Investment fees	(18,986)	(12,139)	(31,125)	(34,998)
Total Net Investment Return	1,628,171	1,623,496	3,251,667	(5,335,047)
LESS: INVESTMENT RETURN DESIGNATED FOR CURRENT OPERATIONS				
	(2,019,731)	(1,171,634)	(3,191,365)	(3,584,499)
Investment return reduced by the portion of net investment return designated for current operations	(391,560)	451,862	60,302	(8,919,546)
Change in net assets before change in accrued pension cost	(1,496,145)	(1,571,690)	(3,067,835)	(11,951,961)
Change in Accrued Pension Cost	(680,747)	-	(680,747)	3,615,249
Change in Net Assets	(2,176,892)	(1,571,690)	(3,748,582)	(8,336,442)
Net Assets, Beginning of the Year	44,877,026	23,100,496	67,977,522	76,313,964
Net Assets, End of Year	42,700,134	21,528,806	64,228,940	67,977,522

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