



HMRI LEADS THE WAY

70 YEARS OF SCIENTIFIC INNOVATION

1952-2022

SINCE 1952



HMRI | Huntington
Medical Research
Institutes

2021-2022 ANNUAL REPORT

A MESSAGE FROM OUR PRESIDENT & CEO



HMRI has always been an unusually nimble research organization with an outsized impact on biomedical science and human health. Since its founding in 1952, it has enabled talented researchers to seek creative solutions to complex medical problems. During COVID-19, this culture and spirit of creativity prevailed to drive scientific innovation forward. I am especially proud of the tenacity and perseverance our team demonstrated through these unique challenges. We advanced our research capacity and adjusted to educate our high school STEM students through virtual programming.

In 2022, HMRI celebrated 70 years of pioneering research that has changed our world – from the seatbelts we wear every time we ride in the car to life-saving diagnostics like the MRI. We look forward to the future; executing our strategic plan and continuing our legacy of scientific innovation that transforms lives.

This Annual Impact Report highlights the key achievements and scientific discoveries made during fiscal years 2021-2022. Thanks to supporters like you, we are moving swiftly into the future, led by our culture of innovation to fearlessly pursue science that can solve the greatest medical challenges of the heart and brain and the important connection between the two.

We invite you to share our passion for improving lives by joining us in advancing biomedical research. By partnering with individuals and organizations who can provide financial support, raise awareness, and build strategic partnerships, together we will achieve our vision to thrive as a leading independent biomedical research organization, linking our research of tomorrow to continued improvements in human health.

With gratitude,

A handwritten signature in blue ink that reads "Julia". The signature is stylized and fluid.

Julia E. Bradsher, PhD, MBA
President and Chief Executive Officer

**Board of Directors
FY2021 - FY2022**

Jon Atzen*
 M. Helen Baatz*
 John Babcock, Vice Chair, 2022
 John D. Baldeschwieler*
 Cameron Boswell
 C. Joseph Chang
 David Davis
 Roger Engemann
 James J. Femino
 James D. Gamb, Board Chair, 2021;
 Immediate Past Chair, 2022
 Barbara Hunt
 Lawrence W. Jones
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 George D. Leal*
 Alexandra Levine
 Peter M. Menard
 John L. Mothershead,
 Immediate Past Chair, 2021
 Jacquie Ochoa-Rosellini
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 William E. Thomson

**Emeritus Directors
FY2021 - FY2022**

M. Helen Baatz**
 John D. Baldeschwieler
 Michael C. Doyle
 Jerry M. Harrington
 Herbert Hezlep III, deceased,
 December 2021
 Mitchell B. Howe Jr.
 R. William Johnston
 George D. Leal**
 Allen W. Mathies Jr, deceased,
 February 2023
 Lary J. Mielke, deceased, March 2023
 Lynn H. Myers, deceased, April 2023
 Robert Tranquada, deceased,
 December 2022

*FY2021 Only
 **FY2022 Only

Looking back on 2021 and 2022, HMRI had two extraordinary years, advancing biomedical research of the heart and brain, and educating 41 talented young scientists through our dynamic education programs.

Collectively, HMRI scientists published 39 peer-reviewed journal articles, presented 41 abstracts, and gave 56 lectures. HMRI also published two patents, with scientists Anju Vasudevan, PhD, and Alfred Fonteh, PhD as the inventors. Dr. Vasudevan’s R01 grant from the National Institute of Mental Health (NIMH) was renewed until 2027 for the continuation of her research on the novel development pathways underlying psychiatric disorders.

The cardiovascular team welcomed Nicole Purcell, PhD, an associate professor previously at UC San Diego. Her research focuses on intracellular signaling pathways and molecular mechanisms that affect the heart and brain. This will give HMRI researchers new insights as they investigate cellular mechanisms that lead to aging of the heart and brain. Dr. Purcell also serves as HMRI’s Scientific Director of Education Programs, mentoring high school and college students who wish to pursue careers in the sciences.

In 2021, we were still navigating through challenges from the pandemic. Our strong leadership team - the board of directors, my predecessor as chair, James D. Gamb, and the President and CEO, Julia E. Bradsher, PhD, MBA swiftly pivoted and took decisive action to conduct operations in new ways to execute our strategic plan.

I am grateful to every one of our supporters who continued to make gifts to HMRI during this time. Your generosity sustains the innovative scientific discoveries that will allow us to fulfill our mission.

In appreciation of your support,



Susan Kane PhD
 HMRI Board Chair



HMRI IMPACT/ACCOMPLISHMENTS

Scientific Discovery & Biomedical Innovation FY2021-2022



Inspiring the Next Generation of Scientists



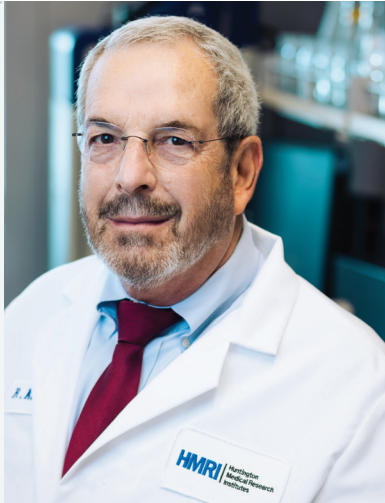
HIGH SCHOOL STEM STUDENTS
 2021 – 8 students, 3 TA’s (virtual)
 2022 – 20 students



SUMMER UNDERGRADUATE RESEARCH FELLOWSHIP (SURF)
 2021 – 0 (due to COVID)
 2022 – 5 students

Sources of Funding for FY2021-2022

	FY2021	FY2022
Contributions, grants, and bequests	\$9.7M	\$3M
Government grants and contracts	\$2.7M	\$2.9M
Other	\$5.4M	\$4.7M
Total	\$17.8M	\$10.6M



Research Updates: Advancing Scientific Discovery through Perseverance and Innovative Biomedical Research

Perseverance defined scientific discovery at HMRI in 2021 and 2022 as we continued to face challenges related to the pandemic. Recruitment of Clinical Brain Aging Study participants slowed, and we experienced delays due to supply chain disruptions. Despite the obstacles, we maintained active research programs in studies of the heart and brain and their connection.

We took big steps forward in understanding lipid metabolism related to cognitive dysfunction and EEG patterns when the brain is stressed, and found ways to reduce opioid use for surgical patients. HMRI added a core biochemistry laboratory, organized the clinical brain aging database, and purchased a NeuroQuant / LesionQuant system to quantitatively assess abnormalities and changes in the brain.

Cardiovascular researchers made novel discoveries on the effect of e-cigarettes on the heart and lungs in preclinical studies with collaborators at UC Irvine. Drs. Wangde Dai and Jianru Shi found that a single acute exposure to e-cigarettes was enough to cause inflammation in the lungs and alter genes. Nicotine increased

blood pressure and the size of heart attacks in animal models.

They also developed a stroke model to consistently calculate the size of strokes which will allow exploration of new therapies that could reduce the amount of damage from a stroke. Dr. Nicole Purcell pursued studies on molecular signaling that affects heart development and pathology.

A foundation-funded study with HMRI, LA County, UCLA, and other institutions examined the effect of COVID-19 on emergency surges and increases in out-of-hospital cardiac arrests. Researchers found that people were afraid to go to the hospital due to the pandemic and were dying from cardiac arrest outside of the hospital instead of seeking life-saving emergency care.

Dr. Anju Vasudevan, Chair and Scientific Director of Neurosciences led the formalized organization of the neuroscience labs. She clearly defined the biomarker lab, where Dr. Alfred Fonteh leads the study of noninvasive urine biomarkers, and the cognition lab, where Dr. Xianghong Arakaki, and her team explore changes in heart rate variability, electroencephalogram (brain wave) patterns, and cognition.

The Angiogenesis and Brain Development Laboratory (ABDL) and Dr. Vasudevan were featured on the cover of *Molecular Psychiatry*, “Human forebrain endothelial cell therapy for psychiatric disorders,” and published “Gabbr3 endothelial cell-specific knockout mice display abnormal blood flow, hypertension, and behavioral dysfunction” in *Scientific Reports*.

Even though we faced pandemic-related hurdles, our scientists persevered and continued to demonstrate their commitment to biomedical research that leads to improved human health. Your dedication and support enable our researchers to gain a better understanding of risk factors for Alzheimer’s disease and less invasive markers for early detection, the neurological dysfunctions of migraine, the mechanisms of heart disease and strokes, and the impact these diseases have on public health and well-being.



Robert A. Kloner, MD, PhD
Chief Science Officer
Head of Cardiovascular Research

FY2021-2022 KEY PUBLICATIONS

CARDIOVASCULAR

Acute Administration of Nicotine Induces Transient Elevation of Blood Pressure and Increases Myocardial Infarct Size in Rats

Zhao L, Dai W, Carreno J, Shi J, Kleinman MT, Kloner RA
Heliyon, November 2020

Effects of OP2113 on Myocardial Infarct Size and No Reflow in a Rat Myocardial Ischemia/Reperfusion Model

Dai W, Amoedo ND, Perry J, Le Grand B, Boucard A, Carreno J, Zhao L, Brown DA, Rossignol R, Kloner RA
Cardiovascular Drugs and Therapy, February 2021

E-Cigarettes and Cardiopulmonary Health

Tarran R, Barr RG, Benowitz NL, Bhatnagar A, Chu HW, Dalton P, Doerschuk CM, Drummond MB, Gold DR, Goniewicz ML, Gross ER, Hansel NN, Hopke PK, Kloner RA, Mikheev VB, Neczypor EW, Pinkerton KE, Postow L, Rahman I, Samet JM, Salathe M, Stoney CM, Tsao PS, Widome R, Xia T, Xiao DL, Wold LE

Function, February 2021

Emergency Medical Services Responses to Out-of-Hospital Cardiac Arrest and Suspected ST-Segment-Elevation Myocardial Infarction During the COVID-19 Pandemic in Los Angeles County

Rollman JE, Kloner RA, Bosson N, Niemann JT, Gausche-Hill M, Williams M, Clare C, Tan W, Wang X, Shavelle DM, Rafique AM
Journal of the American Heart Association, June 2021

On the PHLPPside: Emerging Roles of PHLPP Phosphatases in the Heart

Lemoine KA, Fassas JM, Ohannesian SH, Purcell NH
Cellular Signaling, July 2021

Cardiac MRI to Visualize Myocardial Damage after ST-Segment Elevation Myocardial Infarction: A Review of its Histologic Validation

Beijnink CWH, van der Hoeven NW, Konijnenberg LSF, Kim RJ, Bekkers SCAM, Kloner RA, Everaars H, El Messaoudi S, van Rossum AC, van Royen N, Nijveldt R
Radiology, August 2021

Update on Cardioprotective Strategies for STEMI: Focus on Supersaturated Oxygen Delivery

Kloner RA, Creech JL, Stone GW, O'Neil WW, Burkhoff D, Spears JR

Journal of the American College of Cardiology: Basic to Translational Science, October 2021

Analysis of Integrated Clinical Safety Data of Tadalafil in Patients Receiving Concomitant Antihypertensive Medications

Kloner RA, Kostis JB, McGraw TP, Qiu C, Gupta A
The Journal of Clinical Hypertension, February 2022

NEUROSCIENCES

NAD+ Mediated Rescue of Prenatal Forebrain Angiogenesis Restores Postnatal Behavior

Subburaju S, Kaye S, Choi YK, Baruah J, Datta D, Ren J, Kumar AS, Szabo G, Fukumura D, Jain RK, Elkhail A, Vasudevan A
Science Advances, October 2020

Compromised Behavior and Gamma Power During Working Memory in Cognitively Healthy Individuals with Abnormal CSF Amyloid/Tau

Rochart R, Liu Q, Fonteh AN, Harrington MG, Arakaki X
Frontiers in Aging Neuroscience, October 2020

Accumulation of Cerebrospinal Fluid Glycerophospholipids and Sphingolipids in Cognitively Healthy Participants with Alzheimer's Biomarkers Precedes Lipolysis in the Dementia Stage

Fonteh AN, Chiang AJ, Arakaki X, Edminster SP, Harrington MG
Frontiers in Neuroscience, December 2020

EEG Measures for Clinical Research in Major Vascular Cognitive Impairment: Recommendations by an Expert Panel

Babiloni C, Arakaki X, Bonanni L, Bujan A, Carrillo MC, Del Percio C, Edelmayer RM, Egan G, Elahh FM, Evans A, Ferri R, Frisoni GB, Güntekin B, Hainsworth A, Hampel H, Jelic V, Jeong J, Kim DK, Kramerberger M, Kumar S, Lizio R, Nobili F, Noce G, Puce A, Ritter P, Smit DJA, Soricelli A, Teipel S, Tucci F, Sachdev P, Valdes-Sosa M, Valdes-Sosa P, Vergallo A, Yener G
Neurobiology of Aging, March 2021

Measures of Resting State EEG Rhythms for Clinical Trials in Alzheimer's Disease: Recommendations of an Expert Panel

Babiloni C, Arakaki X, Azami H, Bennys K, Blinowska K, Bonanni L, Bujan A, Carrillo MC, Cichocki A, de Frutos-Lucas J, Del Percio C, Dubois B, Edelmayer R, Egan G, Epelbaum S, Escudero J, Evans A, Farina F, Fargo K, Fernández A, Ferri R, Frisoni G, Hampel H, Harrington MG, Jelic V, Jeong J, Jiang Y, Kaminski M, Kavcic V, Kilborn K, Kumar S, Lam A, Lim L, Lizio R, Lopez D, Lopez S, Lucey B, Maestú F, McGeown WJ, McKeith I, Moretti DV, Nobili F, Noce G, Olichney J, Onofrij M, Osorio R, Parra-Rodriguez M, Rajji T, Ritter P, Soricelli A, Stocchi F, Tarnanas I, Taylor JP, Teipel S, Tucci F, Valdes-Sosa M, Valdes-Sosa P, Weiergräber M, Yener G, Güntekin B
Alzheimer's and Dementia: The Journal of the Alzheimer's Association, April 2021

Metabolic Evidence Rather Than Amounts of Red or Processed Meat as a Risk on Korean Colorectal Cancer

Kim E, Lee JS, Kim E, Lee M-A, Fonteh AN, Kwong M, Cho YH, Lee UJ, Yang M
Metabolites, July 2021

Plasma Lipolysis and Changes in Plasma and Cerebrospinal Fluid Signaling Lipids Reveal Abnormal Lipid Metabolism in Chronic Migraine

Castor K, Dawlaty J, Arakaki X, Gross N, Woldeamanuel YW, Harrington MG, Cowan RP, Fonteh AN

Frontiers in Molecular Neuroscience, August 2021

Task Switching Reveals Abnormal Brain-Heart Electrophysiological Signatures in Cognitively Healthy Individuals with Abnormal CSF Amyloid/Tau, a Pilot Study

Arechavala RJ, Rochart R, Klöner RA, Liu A, Wu DA, Hung SM, Shimojo S, Fonteh AN, Kleinman MT, Harrington MG, Arakaki X

International Journal of Psychophysiology, December 2021

Gabrb3 Endothelial Cell-Specific Knockout Mice Display Abnormal Blood Flow, Hypertension, and Behavioral Dysfunction

Agrud A, Subburaju S, Goel P, Ren J, Kumar AS, Caldarone BJ, Dai W, Chavez J, Fukumura D, Jain RK, Klöner RA, Vasudevan A

Scientific Reports, March 2022

An Association Between Saturated Fatty Acid-Containing Phosphatidylcholine in Cerebrospinal Fluid with Tau Phosphorylation

Solomon V, Hafez M, Xian H, Harrington M, Fonteh A, Yassine H

Journal of Alzheimer's Disease, March 2022

Alpha Desynchronization During Stroop Test Unmasks Cognitively Healthy Individuals with Abnormal CSF Amyloid/Tau

Arakaki X, Hung SM, Rochart R, Fonteh AN, Harrington MG

Neurobiology of Aging, April 2022

Calcium-Dependent Cytosolic Phospholipase A

Wang S, Li B, Solomon V, Fonteh A, Rapoport SI, Bennett, DA, Arvanitakis Z, Chui HC, Sullivan PM, Yassine HN

Molecular Neurodegeneration, June 2022

COLORECTAL & LIVER

Brief Report: Management of Perianal Crohn's Disease with Porcine Urinary Bladder Matrix

McCurdy AR, Golan JY, Kaufman HS

The American Surgeon, April 2022

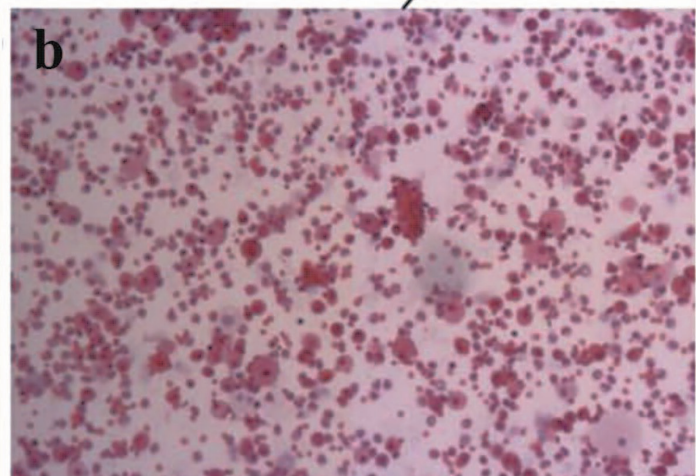
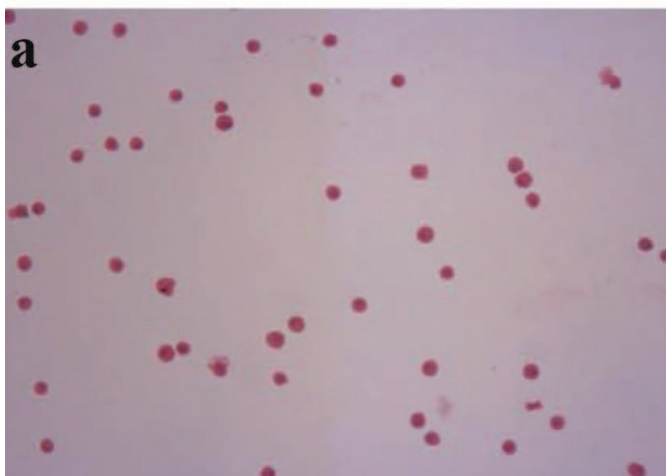
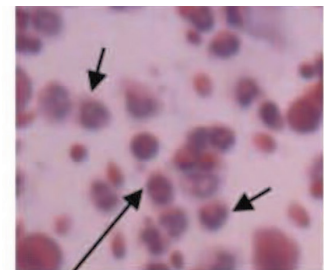
First-Line Therapies for Hepatitis B in the United States: A 3-year Prospective and Multicenter Real-World Study After Approval of Tenofovir Alafenamide

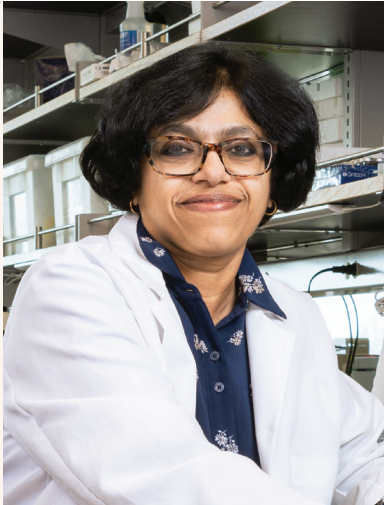
Pan CQ, Afdhal NH, Ankoma-Sey V, Bae H, Curry MP, Dieterich D, Frazier L, Frick A, Hann HW, Kim WR, Kwo P, Milligan S, TongMJ, Reddy KR.

Hepatology Communications, August 2022

One Acute Exposure to E-cigarette Smoke

"The effect of electronic cigarettes on fluid removed from the lungs in experimental models. Left (a) is a lung lavage from an air-treated subject. Right (b) is lung lavage from an e-cigarette plus nicotine-treated subject showing marked inflammatory cells."





Advancing Neuroscience Research to Understand Neurodegeneration and Neuropsychiatric Illnesses

Pioneering research on the brain and its intersection with the heart is led by Anju Vasudevan, PhD, Associate Professor of Neuroscience. Dr. Vasudevan studies brain development and therapies for mental illness, and is Chair and Scientific Director of HMRI's Department of Neurosciences. She also guides the work of investigators who focus on Alzheimer's disease, migraine and other brain disorders.

Vasudevan's research at Harvard University, prior to her arrival at HMRI in 2020, opened a new conceptual framework for understanding angiogenesis (blood vessel formation) in the embryonic brain and its impact on adult behaviors. She investigated endothelial cells—the building blocks of blood vessels—and found that defects in embryonic forebrain endothelial cells can lead to neuropsychiatric illnesses such as schizophrenia, autism, epilepsy, and depression.

At HMRI, Vasudevan and a team of researchers in her Angiogenesis and Brain Development Laboratory

(ABDL) are currently examining the therapeutic potential of repairing and regenerating embryonic forebrain endothelial cells in the prenatal brain to prevent the onset of complex psychiatric symptoms.

Additionally, in 2020-2022 Vasudevan led the restructuring of two new laboratories within the Department of Neurosciences: the Cognition and Brain Integration Laboratory, headed by Assistant Professor Xianghong Arakaki, MD, PhD, and the Biomarker and Neuro-disease Mechanism Laboratory (BNML), headed by Associate Research Professor Alfred Fonteh, PhD. These two new laboratories will create a more specific research focus and a clearer division of responsibilities.

"Both laboratories are studying brain aging and neurodegeneration, but they are approaching it from different perspectives," explains Vasudevan. "Dr. Fonteh is examining potential biomarkers from a biochemical perspective. As part of HMRI's 20-year Brain Aging Study, he is examining changes in lipids excreted in urine from longtime

study participants to see if they are predictive of Alzheimer's disease before any symptoms are present."

"Dr. Arakaki is using electroencephalograms (EEG) to record brain activity and identify new biomarkers in patients with Alzheimer's disease," Vasudevan adds. "Specifically, she is examining electrical activity in the brain and how it's connected with heart rate variability, which is the amount of time between heartbeats."

Together, the laboratories and studies run by Vasudevan, Arakaki and Fonteh enable HMRI to advance scientific discoveries about disorders of the brain from its embryonic beginnings to late adulthood. These discoveries have the potential to dramatically improve the neurological and mental health of hundreds of millions of people.



Intracellular Signaling Pathways Provide New Insights into the Connection between the Heart and Brain

HMRI deepens its understanding of the connection between the heart and brain by investigating molecular pathways. Nicole H. Purcell, PhD, leads this new area of research for the institute, aligned with HMRI's mission to examine the heart-brain connection. She is one of the newest additions to the cardiovascular team, arriving in January 2021 after 15 years as a researcher and professor at UC San Diego. She serves HMRI as an Associate Professor of Cardiovascular Research and Scientific Director of Education Programs. Her work will help scientists better understand the mechanics of heart failure and brain aging.

Signal pathways are the underlying communication system within a cell, giving it the ability to receive, process and transmit signals within itself and with the environment around it. In doing so, signal pathways regulate such critical cellular functions as metabolism, growth, differentiation, and survival. Many of these pathways can become altered when a person's brain ages, or they have a cardiovascular injury.

"We're interested in the signaling pathways that are important in the transition from a healthy heart to a damaged heart, either due to aging or to ischemic damage like a heart

with other molecules and can cause damage to DNA, RNA, and proteins, leading to cell death.

Purcell's team is investigating two types of proteins called PHLPP1 and PHLPP2, both of which are important for cell stability and metabolic regulation. When both proteins are removed, they disrupt the pathways important for cell survival and can cause cancerous tumors to grow. However, the removal of only PHLPP1 may have a therapeutic effect.

"We're trying to understand the cellular targets of the PHLPP proteins in the heart and brain under physiological and pathological conditions," Purcell adds, "using in vitro and in vivo models, we can remove one or both isoforms to investigate how targeting these proteins could be beneficial or detrimental under disease states like heart failure and brain aging. If we can better understand their targets, we can better develop therapeutic strategies to treat these conditions."

"We're interested in the signaling pathways that are important in the transition from a healthy heart to a damaged heart, either due to aging or to ischemic damage like a heart attack," Purcell says. "We increase injury to the heart as we age because we get a buildup of reactive oxygen species, or free radicals, in our cells."

"I wanted more collaboration where the research overlaps with mine. In addition to being a cardiovascular biologist, I also study the heart-brain connection, so HMRI was a perfect fit," Purcell says.

attack," Purcell explains. "We increase injury to the heart as we age because we get a buildup of reactive oxygen species, or free radicals, in our cells." These unstable, oxygen-containing molecules easily react

HMRI Enhances Postdoctoral Fellowship Program



Postdoctoral fellows pictured left to right: Khaja Shameem Mohammed Abdul, Veronica Hubble, Jeong Hoon Ko "JK", Pranya Goel, Divya Desai, Chenchen Xai, Jaspreet Sachdeva

The Postdoctoral Fellowship Program began attracting talented fellows to HMRI in 1955. HMRI enhanced the postdoctoral program in 2021 and 2022 thanks to multiple synergistic funding sources, aligned with our vital mission of inspiring the next generation of scientists.

The program is designed to help fellows engage in scientific pursuits through hands-on experience in cardiovascular research and neuroscience. Postdocs receive one-on-one mentorship from senior researchers and principal investigators for the duration of the program. HMRI fosters interdisciplinary collaborations in state-of-the-art facilities where postdoctoral fellows have an opportunity to produce first and co-authored publications.

Professional development is another core tenet of HMRI's curriculum, designed to prepare fellows for future professional positions. This includes public speaking, grant writing, research rigor, inventions and patents, communications, leadership skills, and resume building.

HMRI is committed to training the next generation of biomedical researchers to produce an elite pool of innovative scientists, dedicated to understanding, preventing, curing, and perhaps someday, alleviating diseases of the heart and brain. Past postdoctoral fellows from HMRI have gone on to join the medical community, advance science as inventors and researchers, and lead well-known biotech companies.

The additional funding HMRI received from supporters and private foundations in 2021 - 2022 provided a necessary and fundamental base for the future success of our postdoctoral researchers, and the future of biomedical innovation.

HMRI Postdoctoral Fellows FY2021 – FY2022

Jeong Hoon Ko "JK", PhD

Neuroscience – Biomarkers and Neuro-disease Mechanism Lab
Mentor: Alfred N. Fonteh, PhD
June 2020 – April 2022

Veronica Hubble, PhD

Neuroscience – Biomarkers and Neuro-disease Mechanism Lab
HMRI Mentor: Alfred N. Fonteh, PhD
Caltech Mentor: Brian M. Stoltz, PhD
September 2020 – Present

Pranay Goel, PhD

Neuroscience - Angiogenesis and Brain Development Lab
Mentor: Anju Vasudevan, PhD
October 2020- June 2022

Divya Desai, PhD

Neuroscience - Angiogenesis and Brain Development Lab
Mentor: Anju Vasudevan, PhD
November 2020 – Present

Jaspreet Sachdeva, PhD

Cardiovascular Research Lab
Mentor: Robert A. Kloner, MD, PhD
February 2021- April 2022

Chenchen Xia, PhD

Neuroscience - Migraine Research
Mentor: Xianghong Arakaki, MD, PhD
February 2021- Present

Khaja Shameem Mohammed Abdul, PhD

Cardiovascular Signaling Lab
Mentor: Nicole H. Purcell, PhD
March 2021 – Present

Abdulhakim Al-Ezzi, PhD

Neuroscience – Cognition and Brain Integration Lab
Mentor: Xianghong Arakaki, MD, PhD
June 2022 – Present

HMRI STEM Education Program for High School Students Inspires the Next Generation of Scientists

The STEM workforce is a major driving force for innovation and growth in the U.S. economy. In 2021, almost 10 million workers were employed in STEM occupations, and the U.S. Department of Labor projects that STEM jobs will grow 11% by 2031, outpacing the demand for all other occupations.

As bioscience leaders, it is our duty to inspire, train, and transfer our scientific knowledge to the next generation of researchers, scientists, and physicians, to pursue research, innovation, and improvements in human health.

In 2021, HMRI launched its STEM program, providing exceptional science education to bright, talented Pasadena area high school students. Eight students participated in the inaugural year, which was conducted virtually due to the pandemic. Under the direction of Dr. Nicole Purcell, Scientific Director of Education Programs, the STEM program grew, and in 2022, HMRI received 51 applications for only 20 spaces. Two sessions were held daily, morning and afternoon, with ten students in each session for six weeks during the summer.

HMRI High School STEM Program curriculum:

Week 1: Research methods, instrumentation, and safety protocols

Week 2: Anatomy of the brain, heart, and lungs

Week 3: Pathology and Radiology

Week 4: Genetics

Week 5: Environmental Science

Week 6: Symposium to present research projects

Mentorship is a critical component in student engagement and for successful completion of the program. The STEM curriculum is taught by Jacqueline Fonesca, a high school AP biology instructor from Los Angeles Unified School District with highly qualified TAs who are current undergraduate students. Ms. Fonesca and the TAs engage the students in conversations about college and various careers in biomedical STEM fields in small daily breakout sessions.

Dr. Purcell is also passionate about mentoring students and stresses the importance of intellectual curiosity. "We want bright students who are highly motivated and excited about science. They may not know what career they want, but this hands-on laboratory experience will inspire them, build their confidence, and guide them to discover their talents and take steps towards their goals."



Students from the morning session of the 2022 High School STEM program.



Jacqueline Fonesca, LAUSD AP biology teacher, dedicates her summers to inspiring HMRI's STEM students.



Dedicating Over 40 Years of Service to the Pasadena Community

Jim and Priscilla Gamb, longtime residents of Pasadena, have been active members of its civic and philanthropic community, dedicating over 40 years of service to organizations benefiting the public through science, medicine, and education - like Huntington Medical Research Institutes (HMRI), the Pasadena Community Foundation, and more.

When their children were young they attended Pacific Oaks Children's School, where her mother had been the first President. Priscilla taught first grade at Washington School in San Gabriel. For 30 years, she was the Volunteer Director at Huntington Hospital and served as a liaison to the Altadena Guild, whose mission supports both the hospital and HMRI.

Jim first became involved with HMRI through his career as a financial planner when a colleague, Phil Swan, Sr. made an introduction in 1989. He first joined the board in 2015 and is currently the Immediate Past Chair. His other key leadership roles have included Vice Chair from 2016 – 2018 and Chair from 2019 – 2021.

During his tenure, construction of the new HMRI building began. He is proud of the board's strategic foresight to raise money for the building, strengthening HMRI's financial position and keeping the organization out of debt. Jim recalled the days when ground-breaking

scientific discovery took place in the basement of the old building on El Molino. "The new building gives HMRI the capacity to grow the scientific staff and to make strategic progress," Jim explains, "and the physical presence near the hospital makes us visible to the community, growing an awareness of what we do and how the scientific research benefits the community."

Jim also had the privilege of serving on the Executive Search Committee to recruit the current President and CEO, Julia Bradsher, PhD, MBA. Jim said, "Julia was an ideal candidate with her dynamic understanding of science and executive talent. She has been an exceptional leader, focused on the strategic growth of HMRI, cultivating an inclusive community, and empowering women leaders and scientists to leverage their strengths and drive innovative research forward, directly impacting the community."

HMRI is grateful for Jim and Priscilla Gamb and their many years of dedicated service. They remain committed because of their alignment and connection to HMRI's mission of improving human health. "It matters to all of us in the community," said Priscilla, "and it feels good to advance research for the heart and brain and their connection." We look forward to their continued support and strategic guidance as we work together to advance our aligned science and education goals.



Kathleen Shannon, Executive Director, Patron Saints Foundation; Carol Thomson; Bill Thomson, HMRI Board Member; Helen Baatz, HMRI Emeritus Director; Susan Kane, HMRI Board Chair

HMRI Celebrates 70 Years of Scientific Discovery and Innovation with Long-term Friends and Supporters.



Kathryn Barger, LA County Supervisor; Julia Bradsher, President & CEO, HMRI; Felicia Williams, Pasadena Vice Mayor



John Babcock, HMRI Board Member; Laura Babcock; Clark Postlewait; Ashley Postlewait; Barclay Quinn; John Mothershead, HMRI Board Member

STATEMENT OF FINANCIAL POSITION

September 30, 2022 (with comparative totals for September 30, 2021)

	Sept 30 2022	Sept 30 2021
ASSETS		
Cash	\$ 4,686,352	\$ 4,946,631
Government and contract receivables	234,945	1,190,696
Other receivables, net	385,085	534,777
Promises to give, net	4,922,760	6,048,191
Prepaid expenses	147,917	111,962
Investments	27,343,142	36,724,949
Property and equipment, net	32,165,263	32,535,409
Patents, net	205,420	167,105
Total Assets	\$ 70,090,884	\$ 82,259,720
LIABILITIES AND NET ASSETS		
Liabilities		
Accounts payable	\$ 408,464	\$ 546,630
Accrued expenses	1,064,704	1,002,400
Refundable advance	3,634	144,917
Accrued pension cost	636,560	4,251,809
Total Liabilities	\$ 2,113,362	\$ 5,945,756
Net Assets		
Net assets without donor restrictions		
Undesignated	\$ 31,879,069	\$ 29,764,856
Designated by the Board	14,067,602	20,653,186
Total Net Assets Without Donor Restrictions	45,946,671	50,418,042
Net assets with donor restrictions	22,030,851	25,895,922
Total Net Assets	67,977,522	76,313,964
Total Liabilities and Net Assets	\$ 70,090,884	\$ 82,259,720

STATEMENT OF ACTIVITIES

Year Ended September 30, 2022 (with comparative totals for September 30, 2021)

	Without Donor Restrictions	With Donor Restrictions	Sept 30 2022	Sept 30 2021
REVENUE, SUPPORT, AND GAINS				
Contributions, grants, and bequests	\$ 1,208,250	\$ 1,763,585	\$ 2,971,836	\$ 9,668,231
Investment return utilized for operations	3,507,688	76,811	3,584,499	3,793,329
Government grants and contracts	2,903,198	-	2,903,198	2,690,195
Paycheck protection program	-	-	-	1,039,287
Clinical and royalty income	1,177,135	-	1,177,135	878,683
Rental income	194,316	-	194,316	159,206
Gain on sale of property and equipment	-	-	-	-
Partnership (loss)	(272,223)	-	(272,223)	(493,203)
Net assets released from restrictions	3,371,412	(3,371,412)	-	-
Total Revenue, Support, and Gains	12,089,775	(1,531,016)	10,558,759	17,735,728
EXPENSES				
Program services	8,409,288	-	8,409,288	8,426,996
Supporting services				
Management and general	4,542,147	-	4,542,147	4,912,370
Fundraising	639,471	-	639,471	372,948
Total supporting services	5,181,618	-	5,181,618	5,285,318
Total expenses	13,590,906	-	13,590,906	13,712,314
Change in Net Assets from Operations	(1,501,131)	(1,531,016)	(3,032,147)	4,023,414
NET INVESTMENT RETURN				
Unrealized losses on investments	\$ (4,012,163)	\$ (3,432,918)	\$ (7,445,081)	\$ 3,988,455
Realized gains on investments	193,766	543,936	737,702	1,990,977
Interest and dividends	761,943	645,387	1,407,330	1,126,926
Investment fees	(21,349)	(13,649)	(34,998)	(35,714)
Total net investment return	(3,077,803)	(2,257,244)	(5,335,047)	7,070,644
LESS: INVESTMENT RETURN DESIGNATED FOR CURRENT OPERATIONS				
	(3,507,688)	(76,811)	(3,584,499)	(4,286,532)
Investment return reduced by the portion of net investment return designated for current operations	(6,585,491)	(2,334,055)	(8,919,546)	2,784,112
Change in net assets before change in accrued pension cost	(8,086,622)	(3,865,071)	(11,951,693)	7,793,932
Change in Accrued Pension Cost	3,615,249	-	3,615,249	329,719
Change in Net Assets	(4,471,373)	(3,865,071)	(8,336,444)	8,123,651
Net Assets, Beginning of the Year	50,418,042	25,895,922	76,313,964	68,190,313
Net Assets, End of Year	\$ 45,946,669	\$ 22,030,851	\$ 67,977,520	\$ 76,313,964

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