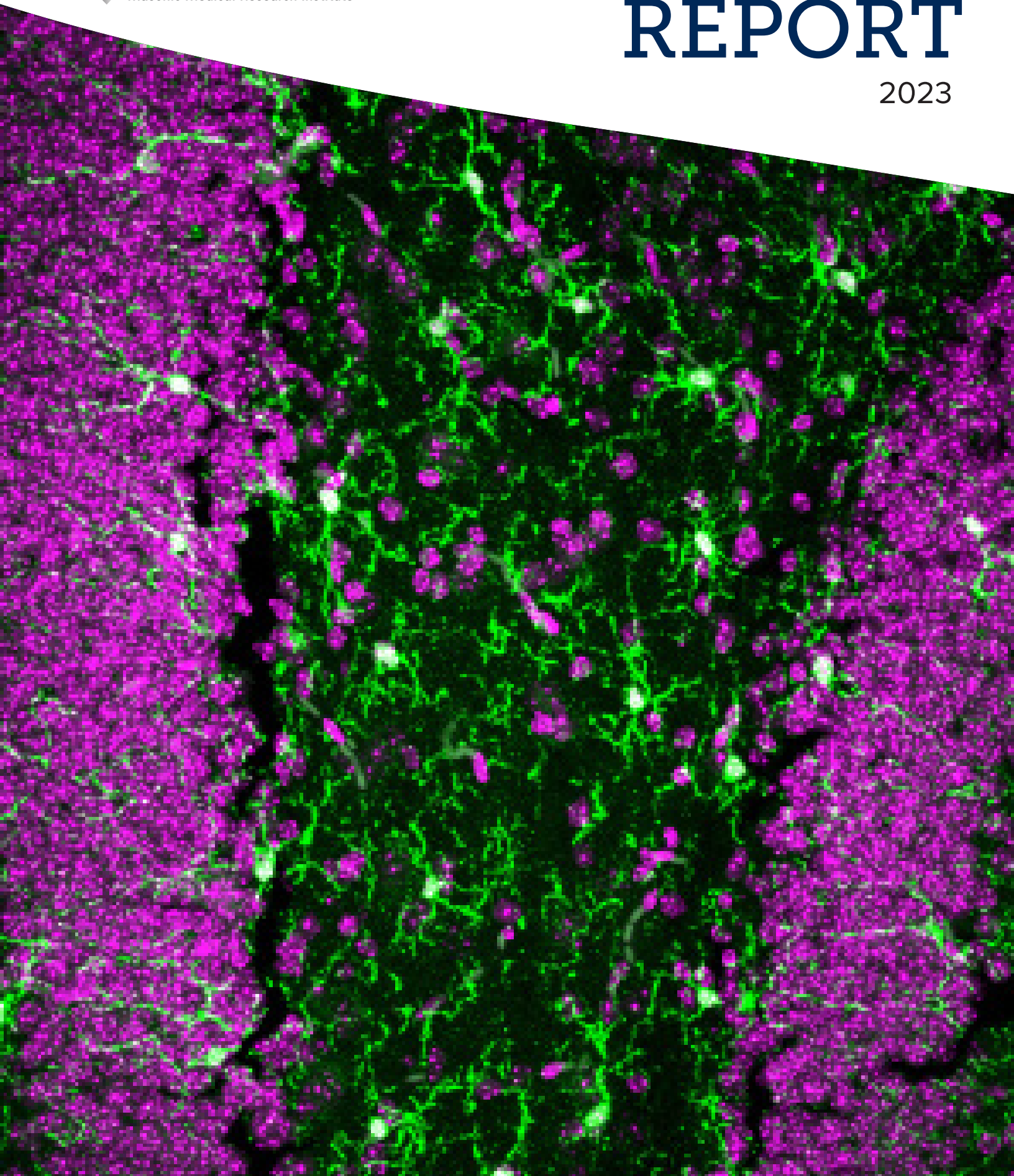


# ANNUAL REPORT

2023



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## 2023 Annual Report Cover Image

2023 Annual Report image taken by Chase Kessinger, Ph.D., assistant professor of biomedical research and translational medicine.

In the image: pink and green fluorescence signals indicate nuclei and Iba-1 protein in the hippocampus.



Our current building has been renovated with state-of-the-art equipment and technology.

### Fast Facts Since 2018

- 7 Principal Investigators (and growing) running cutting-edge research laboratories
- 62 employees
- Over 400 published articles in scientific journals
- Multiple patents and patent disclosures
- Countless research breakthroughs.

## About MMRI

Masonic Medical Research Institute (MMRI) is an independent medical research laboratory performing collaborative research in complex diseases and genetic disorders to *enable tomorrow's cures*.

In 1958, MMRI was founded by the New York State Grand Lodge of Free and Accepted Masons after they helped raise funds to eradicate rheumatic diseases. Today, MMRI focuses on **propelling** medical science, **empowering** scientists to take risks, **sharing** ideas and **building** an inclusive community.

### Mission

MMRI is dedicated to improving the health and quality of life for all humankind. Our primary mission is to conduct high-quality basic biomedical and clinical research aimed at generating knowledge and information necessary for understanding molecular mechanisms of disease and the development of medical cures and treatments of tomorrow. MMRI is also committed to providing education and training to basic scientists, clinical researchers and students who will perpetuate and extend the fight against disease worldwide.

### Vision

MMRI's vision is to build scientific teams that can combine molecular biology, chemistry, computation, technology and engineering to create novel approaches to understanding and deciphering causes of disease. Using this knowledge, we will advance basic research to clinical application, therapeutics and cures. To this end, the Institute will foster an environment of creativity, risk-taking and open sharing of data and research. Finally, this new model will seek collaborations, both within the Institute and worldwide, in our mission to combat disease.

## Our Core Research Areas



### Cardiovascular

Cardiovascular disease is the leading cause of death in the United States. Since our humble beginnings in 1958, MMRI has made significant strides in heart disease research with a focus on the molecular and genetic effects that lead to the onset of congenital heart disease, adult-stage heart failure, diabetes-associated cardiovascular disease, cardiac inflammation, cardiomyopathies, atherosclerosis, thrombosis and arrhythmias.



### Neurocognitive

Our teams are working to identify novel genes and causal factors associated with the development of autism, Alzheimer's disease, Parkinson's disease and post-traumatic stress disorder. Specific projects also focus on understanding the environmental, genetic and socioeconomic consequences of increased incidence of autism, as well as determining the molecular and genetic links between neurocognitive anomalies and cardiovascular disease.



### Autoimmune

Our teams are working to identify novel genes and pathways leading to the development of autoimmune disorders, including systemic lupus erythematosus (SLE), type I diabetes, rheumatoid arthritis and psoriasis. We are working to understand the molecular targets affected by these genetic changes and are striving to identify better diagnostics and develop novel therapies for treatment, with the goal of finding potential cures for these disorders.

# Board of Directors

The Board of Directors consists of 15 distinguished Freemasons elected to three-year terms by the Grand Lodge of the State of New York, Free and Accepted Masons. Their selection is based upon their outstanding business and professional experience. They all serve the Institute without compensation.



## Update From our Board President



To the Grand Lodge,

I am excited to report that 2023 proved to be successful for all of us at Masonic Medical Research Institute (MMRI).

Financially, MMRI weathered the perfect storm due to the fluctuating state of the stock market, the slow economic recovery and staggering inflation. The board of directors made bold, but calculated decisions to reduce some of our long-term debt. Our for-profit quality assurance testing center is up and running and hopefully will assure a steady return on our investment. Dr. Kontaridis and her scientific staff are continually applying for scientific grants from the National Institute of Health (NIH), federal and state agencies, and various other sources. We are confident that all these efforts will stabilize our financial future.

Scientifically, several new highly talented primary scientific investigators have been hired. Our scientists have applied for several patents this year, which will soon hopefully bear fruit both scientifically and financially. I applaud our scientists, technicians, and our leadership team for their great success in 2023.

We have also been able to attract and hire several talented people in marketing and development. We are encouraged that they will bring fresh and effective new ideas to these programs. We also reinforced our strong partnership with The Lupus and Allied Diseases Association, Inc. (LADA).

In January, we participated in the annual sojourners luncheon in Florida for brothers that now reside in Florida. We proudly supplied them with their 50-year and 55-year aprons. At the Council of Grandmasters annual meeting in Alexandria VA., Dr. Kontaridis and I addressed the assembled Grandmasters from around the world and presented our report on our research projects.

At our Grand Lodge session in May, Dr. Kontaridis and I were able to address the assembled members of the New York Grand Lodge. We reported on the multiple successes and challenges of your MMRI.

These are just a few highlights of a successful and challenging year. Listing our financial successes is a double-edged sword. It shows that we are embraced by many prestigious groups, but may also give one the impression that further support is not needed. I assure you that is not the case as our growth depends on it. Research is expensive. We count on everyone's participation to keep the doors open, to continue to do outstanding research, and to make every New York Mason proud.

On behalf of the board of directors of the Masonic Medical Research Institute and the entire staff, I thank you for your continued support.

Sincerely,

R.:W.: Robert A. Hewson, DPM

### EXECUTIVE COMMITTEE

**Alvaro F. Quiroga-Sanchez**  
Chairman  
**Robert A. Hewson, DPM**  
President  
**Pasquale Imbimbo, Jr.**  
Vice President  
**James D. Swan, Jr.**  
Secretary  
**Vincent Cunzio, CPA**  
Treasurer  
**David F. Schneeweiss, MBA**  
Past President

### MEMBERS

**David D. Goodwin**  
**Peter R. Gray, MD, Ph.D., FACC**  
**Paul A. Guerrero, CMR**  
**Paul G. Huck, Esq.**  
**Richard J. Miller, Jr., Esq.**  
**Paul E. Mossberg**  
**Virgilio S. Quijano**  
**Sheldon B. Richman, Esq.**  
**Frank R. Williams**

### DIRECTORS EMERITI

**John P. Chang, R.Ph.**  
**Paul N. O'Neill**  
**Laurence I. Sussman**  
**Victor G. Webb**  
**Albert J. Wright, III**

## Update From our Executive Director

Dear Supporters and Stakeholders,

As the executive director of the Masonic Medical Research Institute (MMRI), I am excited to reflect on the accomplishments made in the fiscal year ending December 31, 2023, with our annual report. Our dedicated researchers, staff and collaborators have upheld an inspiring commitment to advancing biomedical research in cardiovascular disease, autoimmunity and neurocognitive disorders.

Our achievements over the past 12 months speak volumes about the commitment and generosity of our donors, board of directors and staff. Our six principal investigators (now seven!) left notable impacts in the field, including 11 publications in highly regarded scientific journals, making MMRI's lifelong publication total more than 400. As our discoveries continue to accelerate quickly, we have grown our number of patents and patent disclosures to make them more accessible to humankind.

Our faculty members made remarkable achievements this year. I was especially excited to announce the promotion of Chase Kessinger, Ph.D., from instructor to assistant professor of biomedical research and translational medicine, enabling him to run his own laboratory. His efforts have already shown great success, having received funding from several organizations, including The Battle Within Foundation, Inc., for his work on Post Traumatic Stress Disorder (PTSD) and The Lupus and Allied Diseases Association, Inc. (LADA) for his work on System Lupus Erythematosus (SLE). In addition, we were fortunate to have recruited another principal investigator, Tongbin Wu, Ph.D., from the University of California San Diego to research heart development and cardiovascular medicine.

Our research continues to be supported by federal agencies and national foundations, including the National Institutes of Health (NIH), Department of Defense (DOD), American Heart Association and the Lupus and Allied Diseases Association, Inc., a testament to the quality and significance of the work we do here at MMRI. Grants, though, only fund ~50% of our total costs for research. As such, MMRI, like all the other major research institutions in the U.S., relies heavily on philanthropy to make up the difference. We depend on your support and on you; together, we can reach our research goals to resolve some of the world's worst ailments. In this regard, we are proud to say that we have had a record year in philanthropic support; thank you all so much for your donations. Notably, MMRI received donations in 2023 from 415 first-time donors (Masons and non-Masons alike) - a positive and continuing trend that speaks to the increased awareness we have garnered. We grew our communications team and, alongside the development team, launched several major fundraising events, including our inaugural MMRI Golf Classic at the Yahnundasis Golf Club, New Hartford, New York, which raised \$88,000 for MMRI!

Another major highlight of 2023 was our staff retreat, hosted by our friends at the Fenimore Art and Farmers' Museum in Cooperstown, New York. The science and administrative staff united for a full day to engage in workshops and create strategic goals and initiatives for the upcoming year. The opportunities to collaborate and reflect as an entire staff are rare moments I genuinely embrace.

Our commitment to education continues to be exemplified, and in 2023, our competitive Summer Fellowship internship program welcomed nine undergraduate and graduate students. With a new record for number of applications this past summer, this highly sought-after internship program provides students with hands-on experience in cutting-edge research and, for many, helps prepare them to move on to top-tier graduate schools, medical schools, pharmacy schools, veterinary schools and more. We are truly grateful for our donors who once again supported 100% of this initiative.



As we turn to 2024, we look forward to meeting our strategic goals and growing our vision by focusing more on sustainability - for our institute and for our future. We hope to begin commercializing some of our newest and most significant breakthroughs, creating startup incubators that will allow our scientists to collaborate on our newest innovations in heart disease, lupus, nanotechnologies, autism, non-alcoholic steatohepatitis (NASH) and blindness. We also look forward to welcoming several more scientists in 2024, including Matthew Nystoriak, Ph.D., associate professor of biomedical research and translational medicine, who will focus his program on blood flow in the heart and circadian rhythm.

Together with our donors, community members, staff and board of directors, we have made a lasting impact in 2023, and we are eager to continue building upon this momentum toward achieving our vision to combat the world's most devastating diseases.

Thank you for your continued support and belief in our mission.

Sincerely,

A handwritten signature in cursive script that reads "Maria I. Kontaridis". The signature is written in dark ink on a white background.

Maria I. Kontaridis, Ph.D.  
Executive Director  
Gordon K. Moe Professor and Chair of Biomedical Research and Translational Medicine  
Director of Research



2023 all staff photo

# Administrative Team



**Maria I. Kontaridis, Ph.D.**  
Executive Director  
Gordon K. Moe Professor and  
Chair of Biomedical Research  
and Translational Medicine &  
Director of Research



**Varun Balaji**  
IT Director



**Lisa Cooper, CPA**  
Finance Director



**Curt Fowler**  
Facilities Manager



**Stephen F. Izzo**  
Principal Development  
Officer



**Michael Mayo**  
Controller



**Jason McCarthy, Ph.D.**  
Scientific Operations Director  
Associate Professor of  
Biomedical Research and  
Translational Medicine



**Millie Occhionero**  
Marketing and  
Communications Director

## Compliance

**Kelé Piper**  
Compliance Officer – Consultant

## Development, Marketing & Communications

**Rebekah Hedeon**  
Marketing Coordinator

**Nicole Knoblock**  
Events & Internal Communications  
Coordinator

**Colleen LeFever**  
Public Relations & Marketing Associate

**Shannon Olney**  
Development Administrative Assistant

**Christie Schleider**  
Administrative Assistant to  
Development, Marketing &  
Communications

**Shannon Smith**  
Data Analyst

## Executive Assistant

**Terri Cronin**  
Executive Assistant to Executive  
Director/Executive Support to the  
Board of Directors

## Facilities

**Edgardo Colon**  
Lead Maintenance Mechanic

**John DeMarco**  
Senior Maintenance Technician

**Tom Lloyd**  
Facilities Associate

**Richard Thomas**  
Security

## Finance

**Victoria Ogradnik**  
Accountant

**Travis Thibodeaux**  
Procurement and Contracts  
Administrator

## Grants

**Jessica Densten**  
Grants Administrator/Faculty  
Administrative Assistant

**Crystal Jadwick**  
Grants and Payroll Administrator

**Eleanor Kuszmar**  
Grant Administrator – Consultant

## Human Resources

**Anthony LaPolla**  
Human Resources Officer – Consultant

## Information Technology

**Tom Massaro**  
IT Specialist

## Scientific Writer

**Frank Dinunno, Ph.D.**  
Scientific Grants and Manuscript Writer

**Coralie Poizat, Ph.D.**  
Scientific Writer

# Principal Investigators



**Maria I. Kontaridis, Ph.D.**  
Executive Director  
Gordon K. Moe Professor and  
Chair of Biomedical Research and  
Translational Medicine  
Director of Research

Dr. Kontaridis is making significant progress in understanding the link between cardiovascular disease and autism. Her team's cutting-edge discoveries have identified new mutations that link causes of autism with congenital heart defects.



**Chase Kessinger, Ph.D.**  
Assistant Professor of Biomedical  
Research and Translational Medicine

Dr. Kessinger received funding from the Battle Within Foundation to research Post-Traumatic Stress Disorder (PTSD), a disease that affects more than six percent of Americans (CDC). His focus is on studying the role of inflammation on PTSD.



**Zhiqiang Lin, Ph.D.**  
Assistant Professor of Biomedical  
Research and Translational Medicine

Dr. Lin was the first to publish that the COVID-19 spike protein alone has harmful effects on cardiac function. His work has led him to develop a new research model, which he will use to study long-term consequences of COVID-19 and its effects on heart disease.



**Jason McCarthy, Ph.D.**  
Associate Professor of Biomedical  
Research and Translational Medicine  
Scientific Operations Director

Dr. McCarthy published a breakthrough study that utilizes a nanoparticle platform to target the spleen. Using this strategy to deliver anti-inflammatory drugs, he demonstrated he could reduce cardiac damage and decrease scar size, following a heart attack.



**Nathan Tucker, Ph.D.**  
Assistant Professor of Biomedical  
Research and Translational Medicine

Dr. Tucker received significant support from the NIH to further his research on the genetic risks associated with cardiac arrhythmia. He is one step closer to identifying new therapies for this disease, affecting millions of Americans.



**Tongbin Wu, Ph.D.**  
Assistant Professor of Biomedical  
Research and Translational Medicine

Dr. Wu is the newest member of the MMRI family. His research is focused on developing treatments for left ventricular noncompaction (LVNC) and dilated cardiomyopathy (DCM) during embryonic development to find ways to prevent congenital heart disease.

# Scientific Team

## Postdoctoral Fellows

Saravanakkumar Chennappan, Ph.D.  
 Khanh Ha, Ph.D.  
 Myles Hodgson, Ph.D.  
 Samantha Le Sommer, Ph.D.  
 Zizhen Liu, Ph.D.  
 Farheen Naz, Ph.D.  
 Luana Nunes Santos, Ph.D.  
 Yan Sun, Ph.D.  
 Vikas, Ph.D.  
 Genyu Wang, Ph.D.

## Research Scientist

Gary Aistrup, Ph.D.  
 Robert Gardner, Ph.D.  
 Bing Xu, Ph.D.

## Research Associates

Michelle Lance, Ph.D.  
 Associate Computational Biologist II

Ryan Pfeiffer

Research Associate

## Research Assistants

Zackery Caporale  
 Jeffrey Cheng  
 Riley Cott  
 Amanda Davenport  
 Ariana Della Posta  
 Mayurika Desai  
 Donna Le  
 Aaron Farley

Dasomie Kim  
 Levi Legler  
 Emily Marshall  
 Karlie McCumber  
 Yuriy Milobog  
 Sara Muhic Zukic  
 Steven Negron Cintron  
 Katherine Nelson  
 Tracy Rosati  
 Sandy Thai  
 Emma Zupan

## Affiliated Faculty

Ben Bovin, Ph.D.  
 Lauren Endres, Ph.D.  
 Zhen Ma, Ph.D.  
 Max Majireck, Ph.D.  
 Sathyadev Unudurthi, Ph.D.  
 Kenneth J. Reed, Ph.D.

## Animal Care

Damian Bohler, LATG  
 Animal Research Facilities Manager

Laura Coon

Sr. Animal Care Technician

Kayla Traskos

Animal Care Technician

Lauren Evans

Animal Care Technician

## Electrophysiology

Robert Goodrow, Jr.  
 Electrophysiology Core Manager &  
 Research Associate

## Fluorescence-activated Cell Sorting (FACS)

Samantha Le Sommer, Ph.D.  
 FACS Core Manager

## Gene Therapy

Zhiqiang Lin, Ph.D.  
 Gene Therapy Core Manager

## Genetics

Nathan Tucker, Ph.D.  
 Genetics Core Manager

Ryan Pfeiffer

Genetics Core Co-Manager

## Histology/Imaging/Surgery

Chase Kessinger, Ph.D.  
 Histology/Imaging/Surgery Core  
 Manager

Bing Xu, Ph.D.

Surgeon

## iPSCs

Maria I. Kontaridis, Ph.D.  
 iPSCs Core Manager

# Core Facilities

## ANIMAL CARE

Damian Bohler, LATG

Animal Research Facilities Manager

The animal care department is a support unit for animal-based research at MMRI. Our mission is to provide the best possible veterinary and humane care for the laboratory animal species used by researchers at our institution. We are licensed by the United States Department of Agriculture (USDA), hold a New York State, Department of Health (NYS DOH) license and we hold an assurance with the Office of Laboratory Animal Welfare (OLAW) as part of the Public Health Service (PHS) Policy.

## GENE THERAPY

Zhiqiang Lin, Ph.D.

Gene Therapy Core Manager

The core provides services of packaging Adenovirus, Adeno-associated virus (AAV) and Lenti virus, which are convenient tools for expressing genes of interest in cultured cells or mice. For tissue-specific gene delivery studies, we can package heart specific, adipose tissue-specific or liver-specific AAV vectors. AAV vectors are safe and have been widely used in gene therapy drugs and clinical trials.

## GENETICS CORE

Nathan Tucker, Ph.D.

Genetics Core Manager

Ryan Pfeiffer

Genetics Core Co-manager

The ultimate goal of our genetics core is to identify the factors that are responsible for disease. This knowledge will facilitate the development of gene-specific therapies and cures for heart failure, congenital heart disease and arrhythmias. It also provides us the opportunity to identify individuals at risk for sudden cardiac death.

## ELECTROPHYSIOLOGY

Robert Goodrow

Electrophysiology Core Manager

The electrophysiology core utilizes cardiac and neuronal cells and tissues to study heart or brain electrical activity, respectively. Data is used to understand and compare normal and abnormal heartbeats or arrhythmias, as well as determine signaling functions in neuronal cells of the brain. Techniques include voltage-clamping, utilizing single cells for cardiac ionic channel currents and utilizing tissues for action potential recordings.

## FACS

Samantha Le Sommer, Ph.D.

FACS Core Manager

The Flow Cytometry Core (FCC) at MMRI provides instrumentation and expertise in a broad range of basic and medical science disciplines. Samples are prepared by individual investigators, who then deliver samples to the core for flow cytometric analysis, cell labeling or cell sorting.

## HISTOLOGY, IMAGING & SURGERY

Chase Kessinger, Ph.D.

Histology, Imaging & Surgery Core Manager

The Imaging Core was developed to facilitate the non-invasive analysis of preclinical models of disease. The imaging suite is outfitted with state-of-the-art equipment for small animal in vivo imaging using fluorescence, x-ray computed tomography and ultrasound. The histopathology core provides a range of histological services, including tissue fixation and processing, paraffin and cryosectioning, common and advanced histological stains, as well as immunohistochemistry and fluorescence staining. The surgical core provides a range of cardiovascular focused surgical services, including MI myocardial infarction – heart attack; TAC transaortic constriction – heart failure; IR ischemic reperfusion – heart attack; various chronic vascular surgeries to induce blood clots - DVT; and pressure-volume loops – heart failure. Other surgical procedures can also be requested.

## iPSCs CORE

Maria I. Kontaridis, Ph.D.

iPSCs Core Manager

The iPSCs Core is a state-of-the-art tissue culture facility that utilizes CRISPR-technology and genome editing to elevate stem cell investigations. The iPSCs Core provides various services, trainings and access to top-of-the-line equipment, including:

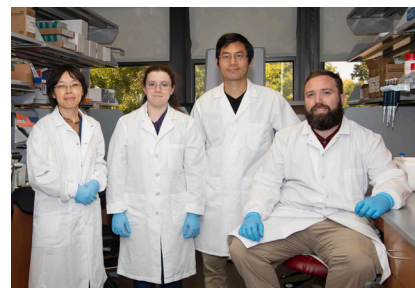
- Multi Electrode Array (MEA)
- Electroporation system
- Dedicated cell culture room
- Dedicated brightfield microscope.



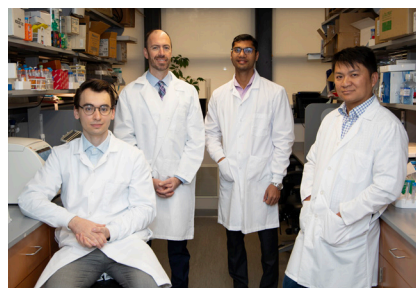
Kontaridis Lab September 2023



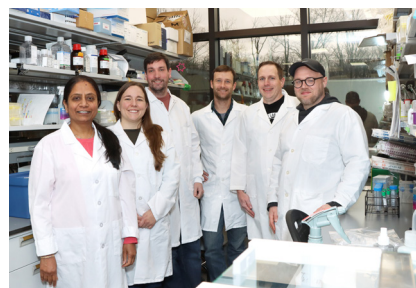
Kessinger Lab September 2023



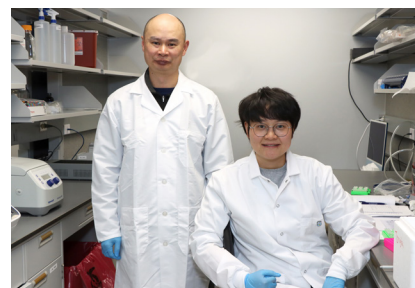
Lin Lab September 2023



McCarthy Lab September 2023



Tucker Lab September 2023



Wu Lab September 2023



## Dr. Chase Kessinger Promoted to Assistant Professor

Dr. Kessinger joined MMRI in 2018 as an instructor in the McCarthy Lab, where he became adept in his imaging techniques. In January of 2023, Dr. Kessinger was promoted to assistant professor of biomedical research and translational medicine. He focuses on deep vein thrombosis, heart failure, post-traumatic stress disorder (PTSD), lupus and other cardiovascular diseases. MMRI is thrilled to have the Kessinger Lab!



“I think Dr. Kessinger is a knowledgeable PI who demonstrates a good balance of hard work and patience (and fun). Overall, he’s just a great guy to be around!”

- Steven Negrón  
Research Assistant



“Dr. Kessinger is an incredible mentor who fosters an environment conducive to learning while allowing space for individual growth. This is a tricky balance to achieve, and I feel lucky to have learned so much from him during the past year!”

- Riley Cott  
Research Assistant



“I have always known that Dr. Kessinger was on a trajectory to be an accomplished principal investigator. From our first collaborations over a decade ago through today, it was always evident that his multifaceted skillset was well-suited for success. I greatly look forward to watching him further develop his science, using imaging strategies to study disease mechanisms.”

- Dr. Jason McCarthy  
Associate Professor



## Halfond-Weil Postdoctoral Fellowship Awarded to Dr. Chennappan

SARAVANAKKUMAR CHENNAPPAN, PH.D., IS THE RECIPIENT OF THE 2023 HALFOND-WEIL POSTDOCTORAL FELLOWSHIP, WHICH IS SPONSORED BY THE EIGHTH MASONIC DISTRICT ASSOCIATION OF MANHATTAN CHARITY FUND.



A postdoctoral fellow in the Kontaridis Lab since 2020, Dr. Chennappan studies human organ development in rare genetic disorders. His work is focused on reprogramming adult cells into inducible pluripotent stem cells (iPSCs), which can then be transformed into a different cell of interest, such as a heart cell or brain cell. This method allows MMRI scientists to model diseases more accurately and test potential treatments.

new scientists as they grow into their independent scientific careers. Dr. Chennappan has already made an indelible mark with his work at MMRI. He co-authored two peer-reviewed studies in 2022, one concerning RASopathies in the emergence of biogenetics and the other on the role of Costello Syndrome in mediating metabolic abnormalities. We look forward to seeing how Dr. Chennappan will use this grant for additional promising projects in 2023 and beyond.

The Halfond-Weil Postdoctoral Fellowship is a competitive grant awarded annually to a talented postdoctoral fellow at MMRI. This grant helps support

We thank the Eighth Masonic District Association of Manhattan Charity Fund for its support of The Halfond-Weil Postdoctoral Fellowship and the critical research that emanates from it!

## MMRI WELCOMES NEW FACULTY MEMBER FROM UCSD WITH LABORATORY FOCUSED ON HEART DEVELOPMENT AND CARDIOVASCULAR MEDICINE

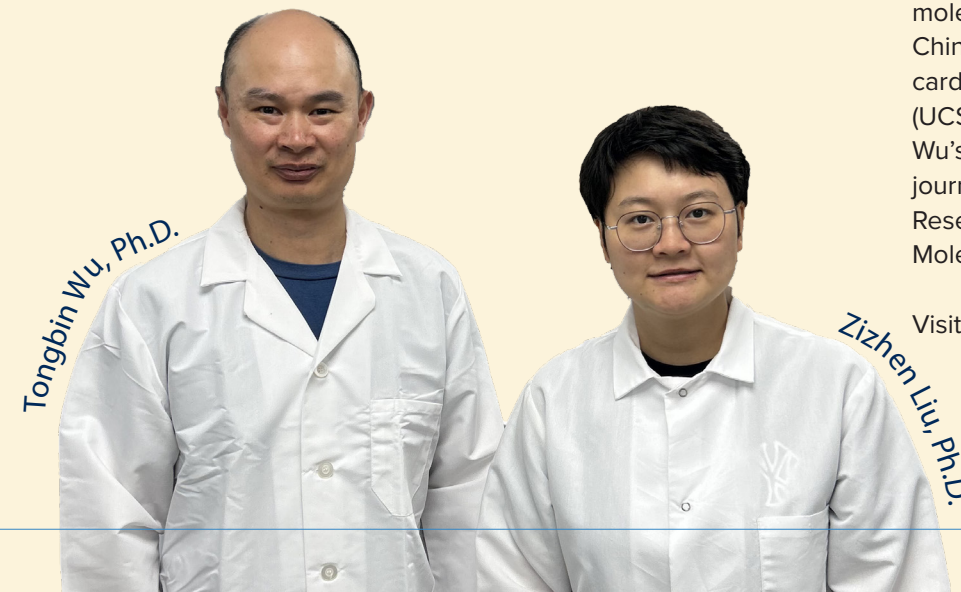
**Tongbin, Wu, Ph.D., assistant professor of biomedical research and translational medicine**

Dr. Tongbin Wu’s laboratory, which includes, Zizhen Liu, Ph.D., postdoctoral fellow, will research novel therapeutic targets and advance the development of treatments for left ventricular noncompaction (LVNC), a cardiac muscle disorder in which the lower left chamber of the heart does not develop correctly, also known as “spongy heart.” His work will also focus on studying dilated cardiomyopathy (DCM), a heart muscle disease that makes it difficult for the heart to pump blood.

“My work is dedicated to mapping the intricate web of factors that control the types of proteins that are produced in the heart, which is then used to create targets for therapeutics for when the heart is affected by disease,” said Dr. Wu. “I’m excited to join the collaborative environment here at MMRI and to continue my important research.”

Dr. Wu completed his Ph.D. in biochemistry and molecular biology at Wuhan University, Wuhan, China, and his postdoctoral training in molecular cardiology at the University of California San Diego (UCSD), San Diego, California. While at UCSD, Dr. Wu’s work was published in highly regarded scientific journals including, Circulation, PNAS, Circulation Research, PLOS Genetics and Nature Structure and Molecular Biology.

Visit [mmri.edu](http://mmri.edu) to learn more about their research.



## Robert Goodrow Celebrates 43 years at MMRI

Robert Goodrow, research associate and electrophysiology core manager, celebrated 43 years at MMRI in October of 2023.

“Bob has been a tremendous member of the MMRI team who has led the electrophysiology core since he started in 1980,” said Dr. Maria I. Kontaridis, executive director. “We wouldn’t be where we are today without his knowledge and history.”





# 2023 MMRI Publications

All of our publications are published in high profile, top-tier peer review journals.

## Transcriptional profile of the rat cardiovascular system at single cell resolution.

Arduini A, Fleming SJ, Xiao L, Hall AW, Akkad AD, Chaffin M, Bendinelli KJ, Tucker NR, Papangeli I, Mantineo H, Babadi M, Stegmann CM, García-Cardeña G, Lindsay ME, Klattenhoff C, Ellinor PT. *bioRxiv* [Preprint]. 2023 Nov 16;2023.11.14.567085. doi: 10.1101/2023.11.14.567085. PMID: 38014050; PMCID: PMC10680727.

## The 8th International RASopathies Symposium: Expanding research and care practice through global collaboration and advocacy.

Pierpont EI, Bennett AM, Schoyer L, Stronach B, Anschutz A, Borrie SC, Briggs B, Burkitt-Wright E, Castel P, Cirstea IC, Draaisma F, Ellis M, Fear VS, Frone MN, Flex E, Gelb BD, Green T, Gripp KW, Khoshkhoo S, Kieran MW, Kleemann K, Klein-Tasman BP, Kontaridis MI, Kruszka P, Leoni C, Liu CZ, Merchant N, Magoulas PL, Moertel C, Prada CE, Rauen KA, Roelofs R, Rossignol R, Sevilla C, Sevilla G, Sheedy R, Stieglitz E, Sun D, Tiemens D, White F, Wingbermühle E, Wolf C, Zenker M, Andelfinger G. *Am J Med Genet A*. 2023 Nov 15. doi: 10.1002/ajmg.a.63477. PMID: 37969032.

## Biomimetic Nanomaterials for the Immunomodulation of the Cardiosplenic Axis Postmyocardial Infarction.

Bose RJ, Kessinger CW, Dhammu T, Singh T, Shealy MW, Ha K, Collandra R, Himbert S, Garcia FJ, Oleinik N, Xu B, Vikas, Kontaridis MI, Rheinstädter MC, Ogretmen B, Menick DR, McCarthy JR. *Adv Mater*. 2023 Nov 7:e2304615. doi: 10.1002/adma.202304615. PMID: 37934471.

## Loss of the Atrial Fibrillation-Related Gene, *Zfx3*, Results in Atrial Dilatation and Arrhythmias.

Jameson HS, Hanley A, Hill MC, Xiao L, Ye J, Bapat A, Ronzier E, Hall AW, Hucker WJ, Clauss S, Barazza M, Silber E, Mina JA, Tucker NR, Mills RW, Dong JT, Milan DJ, Ellinor PT. *Circ Res*. 2023 Aug 4;133(4):313-329. doi: 10.1161/CIRCRESAHA.123.323029. Epub 2023 Jul 14. PMID: 37449401; PMCID: PMC10527554.

## Recent Advances in the Development of Liquid Crystalline Nanoparticles as Drug Delivery Systems.

Leu JSL, Teoh JJX, Ling ALQ, Chong J, Loo YS, Mat Azmi ID, Zahid NI, Bose RJC, Madheswaran T. *Pharmaceutics*. 2023 May 6;15(5):1421. doi: 10.3390/pharmaceutics15051421. PMID: 37242663; PMCID: PMC10224018.

## Cell-Specific Mechanisms in the Heart of COVID-19 Patients.

Tsai EJ, Čiháková D, Tucker NR. *Circ Res*. 2023 May 12;132(10):1290-1301. doi: 10.1161/CIRCRESAHA.123.321876. Epub 2023 May 11. Erratum in: *Circ Res*. 2023 Jun 23;133(1):e18. PMID: 37167361; PMCID: PMC10171292.

## More than a key—the pathological roles of SARS-CoV-2 spike protein in COVID-19 related cardiac injury.

Lin Z. *Sports Med Health Sci*. 2023 Mar 30. doi: 10.1016/j.smhs.2023.03.004. Epub ahead of print. PMID: 37361919; PMCID: PMC10062797.

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## Diets, Gut Microbiota and Metabolites.

Liu Y, Zhong W, Li X, Shen F, Ma X, Yang Q, Hong S, Sun Y. *Phenomix*. 2023 Mar 2;3(3):268-284. doi: 10.1007/s43657-023-00095-0. PMID: 37325710; PMCID: PMC10260722.

## Myh6 promoter-driven Cre recombinase excises floxed DNA fragments in a subset of male germline cells.

Sheldon C, Kessinger CW, Sun Y, Kontaridis MI, Ma Q, Hammoud SS, Gao Z, Zhang H, Lin Z. *J Mol Cell Cardiol*. 2023 Feb;175:62-66. doi: 10.1016/j.yjmcc.2022.12.005. Epub 2022 Dec 28. PMID: 36584478; PMCID: PMC9974737.

## The rising tide raises all ships.

Le Sommer S. *Immunol Cell Biol*. 2024 Feb;102(2):93-96. doi: 10.1111/imcb.12681. Epub 2023 Aug 14. PMID: 37580062.

## Myofibroblast-specific inhibition of the Rho kinase-MRTF-SRF pathway using nanotechnology for the prevention of pulmonary fibrosis.

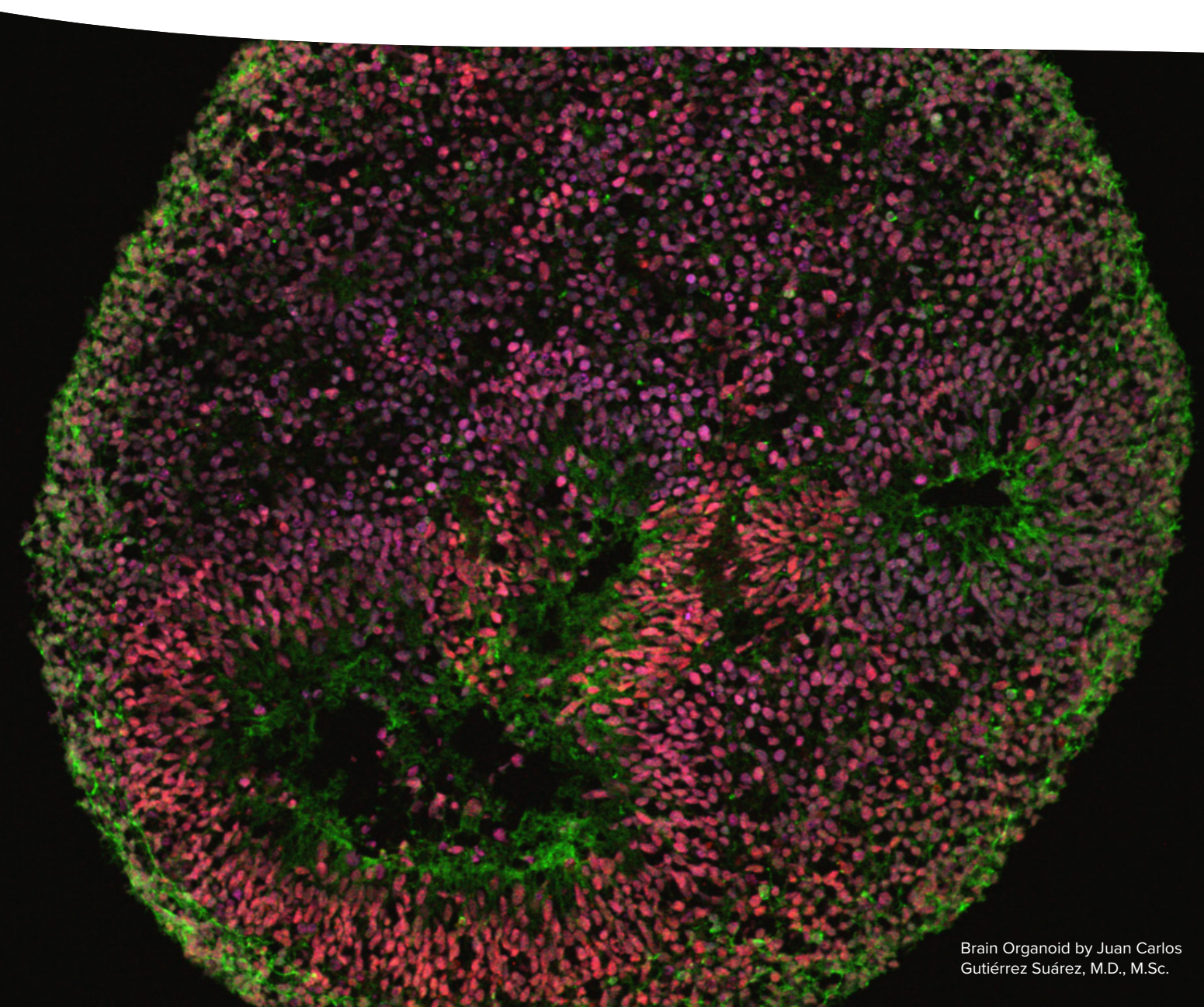
Knipe RS, Nurunnabi M, Probst CK, Spinney JJ, Abe E, Bose RJC, Ha K, Logue A, Nguyen T, Servis R, Drummond M, Haring A, Brazee PL, Medoff BD, McCarthy JR. *Am J Physiol Lung Cell Mol Physiol*. 2023 Feb 1;324(2):L190-L198. doi: 10.1152/ajplung.00086.2022. Epub 2023 Jan 10. PMID: 36625494; PMCID: PMC9925159.

## Single-Nuclear RNA Sequencing of Endomyocardial Biopsies Identifies Persistence of Donor-Recipient Chimerism With Distinct Signatures in Severe Cardiac Allograft Vasculopathy.

Amancherla K, Qin J, Hulke ML, Pfeiffer RD, Agrawal V, Sheng Q, Xu Y, Schlendorf KH, Lindenfeld J, Shah RV, Freedman JE, Tucker NR, Moslehi J. *Circ Heart Fail*. 2023 Jan;16(1):e010119. doi: 10.1161/CIRCHEARTFAILURE.122.010119. Epub 2022 Dec 16. PMID: 36524467; PMCID: PMC9852032.

## Biallelic PRMT7 pathogenic variants are associated with a recognizable syndromic neurodevelopmental disorder with short stature, obesity, and craniofacial and digital abnormalities.

Cali E, Suri M, Scala M, Ferla MP, Alavi S, Faqeih EA, Bijlsma EK, Wigby KM, Baralle D, Mehrjardi MYV, Schwab J, Platzer K, Steindl K, Hashem M, Jones M, Niyazov DM, Jacober J, Littlejohn RO, Weis D, Zadeh N, Rodan L, Goldenberg A, Lecoquierre F, Dutra-Clarke M, Horvath G, Young D, Orenstein N, Bawazeer S, Vulto-van Silfhout AT, Herenger Y, Dehghani M, Seyedhassani SM, Bahreini A, Nasab ME, Ercan-Sencicek AG, Firoozfar Z, Movahedinia M, Efthymiou S, Striano P, Karimiani EG, Salpietro V, Taylor JC, Redman M, Stegmann APA, Laner A, Abdel-Salam G, Li M, Bengala M, Müller AJ, Digilio MC, Rauch A, Gunel M, Titheradge H, Schweitzer DN, Kraus A, Valenzuela I, McLean SD, Phornphutkul C, Salih M, Begtrup A, Schnur RE, Torti E, Haack TB, Prada CE, Alkuraya FS, Houlden H, Maroofian R. *Genet Med*. 2023 Jan;25(1):135-142. doi: 10.1016/j.gim.2022.09.016. Epub 2022 Nov 18. PMID: 36399134; PMCID: PMC10620944.





## \$3.9 Million NIH Grant to Tucker Lab for Researching Genetic Risks Associated with Cardiac Arrhythmia

The National Heart, Lung and Blood Institute (NHLBI) of the National Institutes of Health (NIH) granted \$3.9 million to support a research project led by Principal Investigator Nathan Tucker, Ph.D., who is an assistant professor of biomedical research and translational medicine at MMRI. His research will focus on studying the genetic risks linked to cardiac arrhythmia. More specifically, Dr. Tucker's research hopes to uncover the specific genes that could lead to a cardiac arrhythmia in order to generate novel therapeutic approaches and guide clinical practices. NIH grants are highly competitive, marking a particular point of distinction for both Dr. Tucker and MMRI.



## \$200,000 Awarded to MMRI for Lupus Research from the Lupus and Allied Diseases Association, Inc. (LADA)

Kathleen Arntsen, president and CEO of the Lupus and Allied Diseases Association, Inc., is a strong advocate for raising awareness, conducting research and promoting advocacy for lupus. LADA has been a dedicated partner in supporting lupus research at MMRI. At their 23rd annual Lupus Charity Golf Classic, they generously contributed \$200,000 to fund four of our innovative research projects focused on systemic lupus erythematosus (SLE). The money graciously donated by LADA will directly benefit Dr. Kontaridis', Dr. Kessinger's and Dr. McCarthy's research. **Thank you LADA!**



## McCarthy Lab Awarded Multiple NIH Grants

Jason McCarthy, Ph.D., scientific operations director and associate professor of biomedical research and translational medicine at MMRI, received several competitive grants from the National Institutes of Health (NIH), including:

- This R21 NIH grant will focus on the development of polyphosphate based materials to drive bone growth (osteoinduction). Materials generated will be compared to determine which best possess optimal properties for therapeutics, while also having minimal unwanted side effects, such as clotting or inflammation. Importantly, these materials will be compared head-to-head with the "gold standard" to ultimately determine the highest efficacy. This work is conducted in collaboration with Jonathan Schoenecker, MD, Ph.D., Vanderbilt University Medical College.
- A second R21 takes this process a step further as he plans to develop implantable materials that will

create a synthetic coat on the surface of a donor's bone to provide better integration with a recipient's bone. This award will explore whether these materials have the potential to increase the efficiency of these grafts at a cost significantly less than what is currently used in the clinic. This work is also conducted in collaboration with Jonathan Schoenecker, MD, Ph.D., Vanderbilt University Medical College.

- A third study will delve into lupus. Specifically, the research team will consider how the localization of therapeutics to the spleen, which regulates immune response and generates antibodies, might enable a systemic therapeutic effect for systemic lupus erythematosus (SLE). This research will be conducted in collaboration with Maria I. Kontaridis, Ph.D., MMRI.

# 2023 Federal and Foundational Grant Funding

**National Institutes of Health R21 Research Grant**  
03/01/23 – 02/28/25 • \$205,590/year  
(McCarthy, PI; Kontaridis, Co-Inv.)

**Splenic Modulation of SHP-2 Activity as a Therapeutic Option for Systemic Lupus Erythematosus**  
This project investigates a novel paradigm for the treatment of lupus, whereby modulators of the protein tyrosine phosphatase SHP-2 are delivered directly to the spleen with the goal of eliciting a systemic therapeutic effect.

**American Heart Association Transformational Project Award**  
07/01/23 – 06/30/26 • \$24,000/year  
(Namakkal-Soorappan/University of Alabama, PI; Kontaridis, Co-Inv.)

**Atrial Remodeling Precedes Ventricular Dysfunction in Proteotoxic Cardiac Disease**  
This project proposes to determine whether proteotoxicity impairs electrical signaling and induces atrial remodeling and if enhancing autophagy-dependent PQC preserves electrical function and prevents atrio-ventricular remodeling. The outcome of this transformative award will enable us to systematically plan on translational research to explore whether premature atrial remodeling that precedes ventricular dysfunction over time.

**National Institutes of Health R01 Research Grant**  
03/01/23 – 02/28/25 • \$776,234/year  
(Tucker, PI; Margulies/University of Pennsylvania, Co-Inv.; Auerbach/SUNY Upstate Medical University, Co-Inv.)

**From Variants to Mechanisms for Cardiac Arrhythmias**  
This project proposes to identify the gene targets for arrhythmia association loci using state of the art molecular approaches (chromatin conformation capture and single cell eQTL analysis) in human cardiac tissue samples.

**American Heart Association Innovative Project Award**  
07/01/23 – 06/30/25 • \$100,000/year  
(Tucker, PI)

**"Protein truncating" variation in Titin: Testing the resiliency of the transcriptional machinery to avoid cardiomyopathy**  
This project proposes to address if reparative splicing occurs in response to putative PTVs in TTN.

**Battle Within Foundation**  
04/01/23 – 03/31/24 • \$62,500  
(Kessinger, PI)

Investigating the modulation of inflammation in the preconditioning, development and maintenance of PTSD

**Lupus and Allied Diseases Association, Inc.**  
08/01/23 – 07/31/24 • \$50,000  
(Kontaridis, PI)

**Gain of function mutations in SHP2 enhance inflammatory macrophage (Mo) activation in SLE**  
This project will highlight the importance of EVs in treatment of SLE and will identify exosomes as a potential new therapeutic approach to treating lupus patients.

**Lupus and Allied Diseases Association, Inc.**  
08/01/23 – 07/31/24 • \$50,000  
(Kontaridis, PI)

**Use of cardiosphere-derived human exosomes as therapeutic agents in SLE**  
This project will determine whether SHP2 differentially regulates the pathogenesis of SLE through its regulation of the JAK-STAT and PI3K-AKT signaling pathways, inducing activation of Mφ and mediating production of cytotoxic cytokines, respectively.

**Lupus and Allied Diseases Association, Inc.**  
08/01/23 – 07/31/24 • \$50,000  
(Kessinger, PI)

**Effects of T and B lymphocytes on Venous Thromboembolism in Systemic Lupus Erythematosus**

**Lupus and Allied Diseases Association, Inc.**  
08/01/23 – 07/31/24 • \$50,000  
(McCarthy, PI)

**Cell-Specific Inhibition of the RhoA Pathway as a Target in Lupus Nephritis**  
This project will utilize advanced materials engineering concepts to generate targeted drug delivery vehicles for the cell-specific modulation of the RhoA pathway in lupus nephritis (LN). These nanomaterials will deliver either classical small molecule inhibitors of downstream targets of this protein, or cutting-edge oligonucleotide-based drugs, capable of selectively increasing or decreasing protein production (antisense oligonucleotides, ASOs, or modified RNA, modRNA), -

directly to injured podocytes, epithelial cells, or fibroblasts within the kidney. This will provide for the manipulation of this pathway in a cell-based-manner within a diseased animal, affording insight into the contribution of RhoA in each cell type to the progression of LN.

**National Institutes of Health K01 Research Grant**  
04/01/18 – 05/31/23 • \$167,400/year  
(Tucker, PI)

**Defining the functional variation underlying atrial fibrillation risk**

Goals of this project include: 1) Generating epigenomic maps of the human left atrium, 2) comprehensively evaluating functional variation at top AF association loci using massively parallel reporter assays, and 3) Identifying the left atrial gene targets of AF association loci using allelic imbalance measurements by allele-specific in situ hybridization and targeted RNA-sequencing. Combined with previously acquired ion channel data and multiscale computer modeling/predictive simulations. My role is to perform the cardiomyocyte experiments which will then be incorporated into a multiscale computer model.

**Department of Veterans Affairs (IPA)  
Intergovernmental Personnel Act**  
04/01/19 – 09/30/23 • \$10,312.50/year (Menick, PI; McCarthy, Co-Inv.)

**Regulatory Role of HDAC in Post-MI Ventricular Remodeling**

This work will give us new molecular insights into the role of class I HDACs in regulating M1>M2 macrophage polarization and possibly open a novel site-directed therapeutic approach to improve post-MI remodeling, ventricular function, and survival.

**National Institutes of Health R01 Research Grant**  
02/01/20 – 01/31/24 • \$62,269/year  
(Henke, PI; McCarthy, Co-Inv.)

**The Monocyte/Macrophage Role in Experimental Deep Vein Thrombosis Resolution and Vein Wall Injury**

Monocyte/macrophages (Mo/MØ) are the primary leukocyte directing two key pathobiologic processes: venous thrombosis resolution and the associated vein wall fibrotic injury. Mo/MØ are classified by their inflammatory or anti-inflammatory functions, which is a dynamic process in vivo. In this proposal, we will: 1) Define the origin and phenotype of Mo/MØ in the thrombosed vein with sex, age, and thrombogenic model variation; 2) Directly determine the Mo/MØ mediated mechanisms of VT resolution and vein wall injury; and 3) Determine if systemic Mo/MØ polarization or local exogenous modulation of thrombus environment can promote VT resolution and vein wall healing.

**National Institutes of Health R01 Research Grant**  
01/01/21 – 12/31/23 • \$32,746/year  
(Schoenecker, PI; McCarthy, Co-Inv.)

**Severe Trauma Provokes Pathologic Continuum of Plasmin Activation**

The major goal of this project is to test our transformative hypothesis that implicates inappropriate early convalescent activation of plasmin, the principle protease of the fibrinolytic system, not only as a key event that initiates pathologic coagulation and inflammation, but also results in a prolonged loss of plasmin activity that is required for proper tissue homeostasis and repair in late convalescence.

**American Heart Association Transformational Grant Award**  
01/01/21 – 12/31/23 • \$99,995.50/year  
(Kontaridis, PI; Ercan-Sencicek, Co-Inv.)

**The role of PTPN11 mutations in autism and heart pathogenesis**

This project will determine how PTPN11 mutations affect signaling cascades responsible for both brain and cardiac cell differentiation and development, leading to the onset of congenital heart disease with autism spectrum disorder.

**American Heart Association Diversity Supplement Award**  
07/01/21 – 06/30/2023 • \$66,554/year  
(Santos, PI)

**The in vivo function of novel PTPN11 mutations in autism and heart pathogenesis**  
Research Supplement to Promote Diversity in Science.

**National Institutes of Health R01 Research Grant**  
08/15/21 – 07/31/23 • \$74,137/year  
(Feinberg, PI; McCarthy, Co-Inv.)

**miR-181b, endothelial cells, and vascular inflammation**

The major goals of this proposal are to identify and evaluate how endothelial miR-181b regulates the DNA damage response, senescence-associated vascular inflammation, and atherosclerosis.

**Department of Defense Lupus Impact Award**  
09/30/21 – 09/29/25 • \$187,500/year  
(Kontaridis, PI)

**Elucidating the Functional Mechanisms by Which the Protein Tyrosine Phosphatase SHP2 is Involved in the Pathogenesis of Systemic Lupus Erythematosus**

The project will determine the signaling pathways and mechanisms by which SHP2 functions to induce lupus pathogenicity.

**National Institutes of Health R01 Research Grant**  
12/15/21 – 11/30/26 • \$640,967/year  
(Lin, PI; McCarthy, Co-Inv.)

**YAP and IRF2BP2 regulation of cardiomyocyte innate immune responses**

YAP and IRF2BP2 play important roles in modulating the innate immune response within cardiomyocytes. Insights into the function of these proteins may potentiate novel therapeutic options for the sequelae of a number of cardiovascular insults including myocardial infarction and sepsis.

**Lupus and Allied Diseases Association, Inc.**  
02/01/22 - 12/31/23 • \$50,000  
(Kontaridis, PI)

**Use of cardiosphere-derived human exosomes as therapeutic agents in SLE**

The project will highlight the importance of EVs in treatment of SLE and will identify exosomes as a potential new therapeutic approach to treating lupus patients.

**Lupus and Allied Diseases Association, Inc.**  
02/01/22 - 12/31/23 • \$50,000  
(Kontaridis, PI)

**Gain-of-function mutations in SHP2 enhance inflammatory macrophage (Mo) activation in SLE**  
This project will determine whether SHP2 differentially regulates the pathogenesis of SLE through its regulation of the JAK-STAT and PI3K-AKT signaling pathways, inducing activation of Mφ and mediating production of cytotoxic cytokines, respectively.

**Lupus and Allied Diseases Association, Inc.**  
02/01/22 - 08/31/23 • \$50,000  
(McCarthy, PI)

**Cell-Specific Inhibition of the RhoA Pathway as a Target in Lupus Nephritis**

In this proposal, we will utilize advanced materials engineering concepts to generate targeted drug delivery vehicles for the cell-specific modulation of the RhoA pathway in lupus nephritis (LN). These nanomaterials will deliver either classical small molecule inhibitors of downstream targets of this protein, or cutting-edge oligonucleotide-based drugs, capable of selectively increasing or decreasing protein production (antisense oligonucleotides, ASOs, or modified RNA, modRNA), directly to injured podocytes, epithelial cells, or fibroblasts within the kidney. This will provide for the manipulation of this pathway in a cell-based manner within a diseased animal, affording insight into the contribution of RhoA in each cell type to the progression of LN.

**American Heart Association Institutional Research Enhancement Award**  
04/01/22 – 03/31/24 • \$38,500/year  
(Majireck, PI; Ha, Co-Inv.)

**CD47-Targeted Nano-Immunotherapy for Treatment of Atherosclerosis**

**National Institutes of Health R21 Research Grant**  
06/03/22 – 05/31/24 • \$222,160/year  
(McCarthy, PI; Schoenecker, PI)

**Mechanistic insights into polyphosphate-mediated osteoinduction**

There is an urgent need for the creation of cost-effective biomaterials to promote bone growth in clinical situations where fractures are not healing properly or where extra bone is required, such as in spinal fusion. This proposal is designed to determine if a natural grafting material derived from platelets, called polyphosphates, are superior to currently available grafting agents. Given the relative availability of polyphosphates as compared to other bone grafting material, the results of these investigations have the potential to greatly impact public health as they will provide a more cost-effective and efficient alternative to currently available products.

**National Institutes of Health R21 Research Grant**  
06/04/22 – 04/30/24 • \$55,314/year  
(Schoenecker, PI; McCarthy, PI)

**An inorganic polyphosphate-impregnated synthetic periosteum drives allograft osteointegration**

Bone allografts have transformed clinical practice in orthopaedics by providing an alternative source of osteoconductive material in lieu of autograft, yet despite their success there remains a significant need to improve osteointegration between the allograft and host bone. This proposal will investigate if application of a ‘synthetic periosteum’ comprised of polyphosphates contained within a hydrogel to the outer surface of a structural allograft, can maximize the biologic potential and drive osteointegration while limiting inflammatory toxicity. Compared to previously proposed biological constructs, this hydrogel-polyphosphate construct is designed to be cost-effective, shelf-stable, and result in limited toxicity and host-rejection, thereby making it promising for clinical translation.

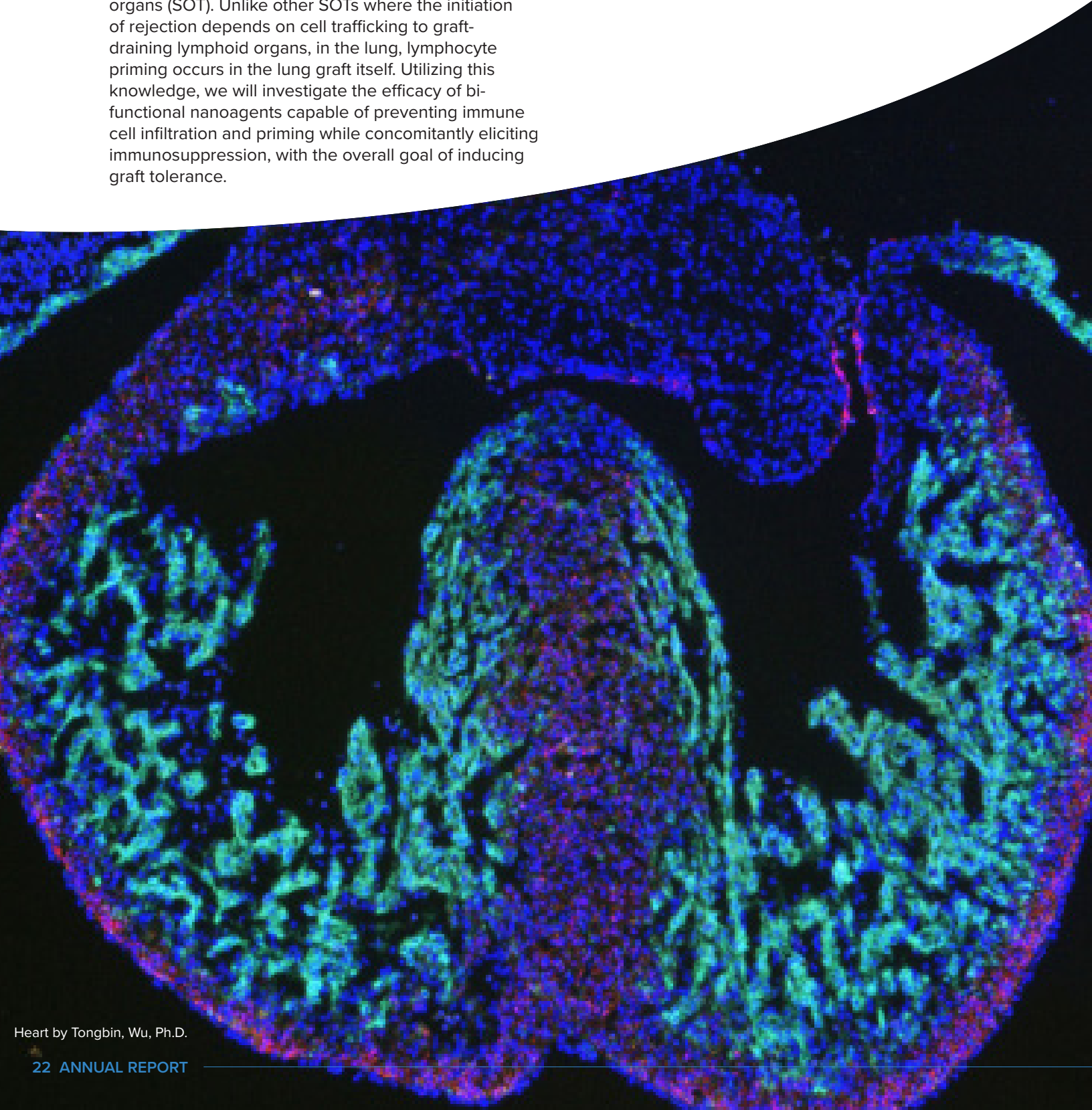
**SUNY Poly Sigma Xi**  
06/15/22 - 06/14/23 • \$1,000  
(McCarthy Lab)

**Ultrasound-assisted disulfide bond formation: a powerful tool for cyclization of fluorogenic peptide.**

**National Institutes of Health U01 Research Grant**  
09/01/22 – 06/30/27 • \$168,246/year  
(McCarthy, PI; Atkinson, PI)

**Targeted delivery of immunosuppressive agents to the graft endothelium for the prevention of rejection in lung transplantation**

Lung transplantation is an established therapy for patients with end stage pulmonary failure, yet survival rates after lung transplantation lag behind those observed after transplantation of other solid organs (SOT). Unlike other SOTs where the initiation of rejection depends on cell trafficking to graft-draining lymphoid organs, in the lung, lymphocyte priming occurs in the lung graft itself. Utilizing this knowledge, we will investigate the efficacy of bi-functional nanoagents capable of preventing immune cell infiltration and priming while concomitantly eliciting immunosuppression, with the overall goal of inducing graft tolerance.



## 2023 All Staff Retreat Held at The Farmers' and Fenimore Museums

Departments worked on team building and planning for the upcoming 2024 year.



From left to right: Stephen Izzo, Dr. Nathan Tucker, Dr. Maria I. Kontaridis, Levi Legler, Dr. Myles Hodgson, Dr. Luana Nunes Santos, Ariana Della Posta, Dr. Khanh Ha, Steven Negron, Riley Cott, Edgardo Colon, Dr. Bing Xu and Dr. Tongbin Wu.



Staff enjoying presentations



Dr. Kontaridis giving opening remarks



Dr. Kessinger and Dr. Xu

## Scientific Poster Awards Presented at 2023 All Staff Retreat



Luana Nunes Santos, Ph.D., postdoctoral fellow in the Kontaridis Laboratory, won this year's best overall scientific poster at our 2023 all staff retreat for her poster titled, "CCNQ gene and its potential link in Autism Spectrum Disorder (ASD)".



Aaron Farley, research assistant in the Lin Laboratory, won this year's best presentation of a scientific poster at our 2023 all staff retreat for his project titled, "Cardiac-specific depletion of *irf2bp2* promotes coronary collateral artery formation in female mice".

During a portion of the retreat, some of our postdoctoral fellows and research assistants presented their science. We had three anonymous judges who came together and selected one winner for best overall poster and one winner for best presentation.

**Congratulations, Luana and Aaron!**

# A SUMMER OF SCIENCE: CONGRATULATIONS TO OUR 2023 SUMMER FELLOWS!

MMRI was pleased to welcome its 2023 Summer Fellows. With more than 45 applicants, this year's application pool was by far the largest and most competitive to date.

Over the ten-week program, Summer Fellows worked with their preceptors to design and research a project, which they presented at their graduation on Friday, July 28, 2023.



**Joseph Detraglia**  
*"Macrophage RhoA Improves Cardiac Repair by Promoting Clearance of Apoptotic Cardiomyocytes and Regulating Inflammation After Myocardial Infarction"*  
 University of Rochester, Rochester, New York  
 Preceptors: Maria I. Kontaridis, Ph.D. and Bing Xu, Ph.D.



**Dasomie Kim**  
*"Design and Synthesis of Fluorescent Probe for Molecular Imaging of Thrombin Activation"*  
 Hamilton College, Clinton, New York  
 Preceptors: Jason McCarthy, Ph.D. and Khanh Ha, Ph.D.



**Ryan Klappmeyer**  
*"Optimization of Protocols to Facilitate Cost Effective Human iPSC Culture and Quality Control"*  
 University of Florida, Gainesville, Florida  
 Preceptors: Maria I. Kontaridis, Ph.D. and Saravanakkumar Chennappan, Ph.D.



**Meghan Lynskey**  
*"Linking Microtubules to Arrhythmias: the CEP68 Locus for Atrial Fibrillation"*  
 Rochester Institute of Technology, Rochester, New York  
 Preceptor: Nathan Tucker, Ph.D.



**Joshua Macera**  
*"Analysis of the Inflammatory Response in a Preclinical Model of PTSD"*  
 Binghamton University, Binghamton, New York  
 Preceptor: Chase Kessinger, Ph.D.



**Alexander Mandia**  
*"Using CRISPR Gene Editing to Define the Genetics of Cardiomyopathy"*  
 Lehigh University, Bethlehem, Pennsylvania  
 Preceptor: Nathan Tucker, Ph.D.



**Adelina Rivera**  
*"Design and Synthesis of Myofibroblast-Specific Poly (Lactide-co-Glycolide) Nanoparticles for the Treatment of Fibrosis"*  
 Vassar College, Poughkeepsie, New York  
 Preceptors: Jason McCarthy, Ph.D. and Vikas, Ph.D.



**Nikita Shah**  
*"Loss of VGLL4 Boosts YAP Mitogenic Activity in Adult Murine Cardiomyocytes"*  
 SUNY Polytechnic Institute, Utica, New York  
 Preceptor: Zhiqiang Lin, Ph.D.



**Caitlin Snyder\***  
*"Molecular Imaging of Pulmonary Embolism Induced Inflammation"*  
 SUNY Fredonia, Fredonia, New York  
 Preceptor: Chase Kessinger, Ph.D.

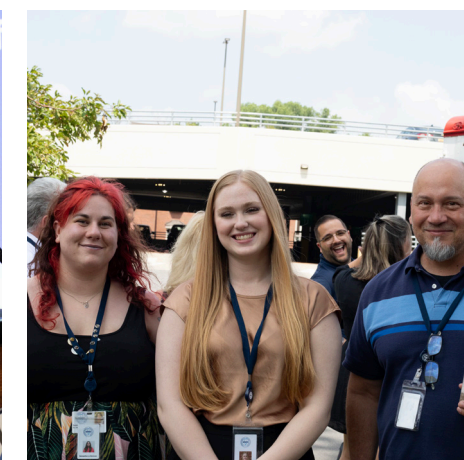
The 2023 Summer Fellowship Program would not have been possible without the generosity of our sponsors:

M&T Bank/Partners Trust Bank Charitable Fund Of  
 The Community Foundation  
 Drs. Atul and Amita Butala  
 The Mele Family Fund  
 Burrows Foundation  
 Mr. Gary T. Forrest  
 Utica Lodge #47 F. & A.M.  
 Steven H. Oram – The Give Back to Utica Fund  
 R.:W.: Walter Leong  
 Alera Group

*\*Recipient, Give Back to Utica Internship Award.*



Marianne Buttenschon, New York State Representative, with 2023 Summer Fellows and Maria I. Kontaridis, Ph.D., executive director.



## MMRI Scientists Inspire Young Students During National Chemistry Week

On October 15 to 21, 2023, MMRI celebrated National Chemistry Week by recognizing members of the team who practice chemistry, all of whom work under Jason McCarthy, Ph.D., associate professor of biomedical research and translational medicine and scientific operations director. Chemistry is unique because it is the study of matter, elements and compounds.



MMRI scientists with kindergarten class at Watson Williams Elementary School.



To bring their love of chemistry to young minds, Vikas, Ph.D., postdoctoral fellow, Yuriy Milobog, research assistant, Jeffrey Cheng, research assistant, Dasomie Kim, research assistant and Catherine Hagearty-Mattern, undergraduate researcher, visited a first-grade classroom at Watson Williams Elementary School, Utica, New York, to conduct a science experiment – for most it was their very first!

Vikas, Ph.D., and Milobog demonstrated that when dry ice is added to water, it sublimates to carbon dioxide, which the students observed in the form of colored bubbles, thanks to a little soap and food coloring.

“This was one of the first introductions to chemistry for many of our first graders and they absolutely loved it,” said Isabella Mancuso, teacher at Watson Williams Elementary School. “It was a great way to get them excited about science and maybe even become a scientist at MMRI someday.”

MMRI’s core mission includes educating the future generations of science at all stages of life, including pre-k, elementary, high school, college and beyond.

## MMRI Gives Back!

MMRI takes pride in giving back to our local community. This holiday season, we had the pleasure of donating items to other local nonprofit organizations.

In October, our staff hosted a hygiene drive for the United Way of the Mohawk Valley. Staff donated items appropriate for newborn to adult, including diapers, soaps, toothpaste, lotions and more!

In November, staff donated canned food items to Feed Our Vets. We also provided staff with their choice of pie for Thanksgiving as a “thank you” for their dedication throughout the year.

In December, MMRI participated in Stuff the Bus, an annual toy drive, presented by our community sponsors, Human Technologies. Thanks to our generous staff, we were able to donate more than 50 toys!



MMRI staff donates to Stuff the Bus.



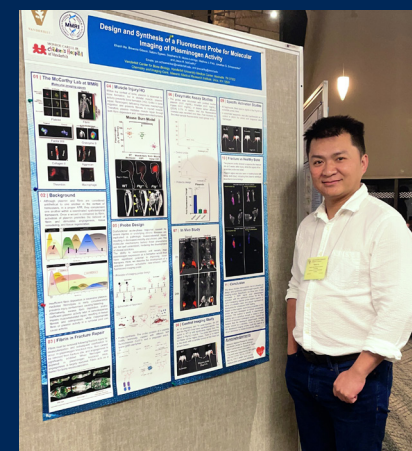
Members of the McCarthy Lab at American Chemistry Society Expo

## McCarthy Lab Attends American Chemistry Society Expo

Khanh Ha, Ph.D., postdoctoral fellow, Catherine Hagearty-Mattern, undergraduate researcher and Jeffrey Cheng, research assistant attended the American Chemistry Society Expo, Indianapolis, Indiana, in March as the official representation of MMRI.

Dr. Ha presented his poster “Design and Synthesis of a Fluorescent Probe for Molecular Imaging of Plasminogen Activity”.

“It’s an honor to represent MMRI at a conference like this! We are showing the world that we have talented scientists and can compete with the best,” said Ha.



## INTRODUCING MMRI’S 2023 EMPLOYEE OF THE YEAR

### Jessica Densten



On Friday, December 15, 2023, at the annual holiday staff party, Dr. Maria I. Kontaridis, executive director, had the pleasure of announcing that this year’s Employee of the Year title belonged to Jessica Densten, MMRI’s grant administrator and faculty administrative assistant.

“Jessica has been an excellent addition to the MMRI team for more than three years,” Dr. Kontaridis said. “Her service and commitment to our mission

continues to grow to meet the challenges of our robust scientific endeavors.”

“Jessica is the best team player, she is reliable and on point,” said an anonymous employee. “She is someone who actively contributes to group projects in order to complete tasks, meet goals and manage projects.”

Dedicated, top-notch, always willing to lend a helping hand, attitude is warm and bright, detail oriented and dependable are just a few of the attributions fellow co-workers associate with Jessica.

“Winning this award is such an honor as there is so much talent at MMRI,” said Densten. “I am extremely appreciative to my colleagues that voted for me!”

*Congratulations Jessica!*

## Holiday Fun!



# MMRI & the Masonic Tradition

## ROYAL ARCH MASONS RECOGNIZED AGAIN FOR DECADES OF GENEROUS SUPPORT

The Grand Chapter State of New York Royal Arch Masons, The Royal Arch Masons Medical Research Foundation, and M.:E.: Paul G. Huck, Esq., Grand High Priest, 2019, were all honored at the Institute on January 21st for their generous support of MMRI, now approaching \$2M. The specific purpose of the event was to dedicate The Grand Chapter State of New York Royal Arch Masons Histology Suite in honor of The Grand Chapter State of New York Royal Arch Masons, and M.:E.: Paul G. Huck, Esq.

Histology is enabling MMRI's scientists to study micro-sized samples of tissues, a process that is vital to the success of biomedical research and to understanding mechanisms that, when aberrantly regulated, cause disease. An explanatory tour of the Histology Suite was led by Chase Kessinger, Ph.D., assistant professor of biomedical research and translational medicine at MMRI.



## NEW YORK RAINBOW GIRLS RAISE \$13,271 TO FUND AUTISM RESEARCH

The Rainbow Girls of New York raised an extraordinary \$13,271 for MMRI scientists to continue their autism research.

The check was presented to MMRI's executive director, Maria I. Kontaridis, Ph.D., on Sunday, April 30, 2023 at a Grand Lodge dinner in New York City, New York.



**"I was thrilled to see these young ladies take charge to lead a positive effort such as this,"** said Dr. Kontaridis **"It is encouraging to see so many young women and girls from across New York work so hard to make a difference in the lives of others."**

## CONNECTICUT MASONS SUPPORT MMRI RESEARCH



The Grand Master of Connecticut, M.:W.: Bruce Bellmore, presented a \$15,000 donation to members of the MMRI leadership team, including Maria I. Kontaridis, Ph.D., executive director, R.:W.: Robert Hewson, DPM, board president and Stephen Izzo, principal development officer.

Thank you for your continued support of the research we do!

## THANK YOU MMRI BOARD MEMBERS!

Thank you to all of our board members for your time, dedication and your generous support of the research we do. Thanks to all of you, we can continue doing ground-breaking research.



Thank you, MMRI board member R.:W.: Sheldon B. Richman, Esq., for your generous contributions to MMRI and our scientific endeavors.



MMRI board members R.:W.:Virgilio S. Quijano and R.:W.:Paul A. Guerrero, CMR, present Maria I. Kontaridis, Ph.D., with a donation on behalf of the Park Lodge #516.



Thank you, MMRI board member and past president, R.:W.: David Schneeweiss, MBA, for your generous contributions to MMRI and our scientific endeavors.

## POST-TRAUMATIC STRESS DISORDER (PTSD) RESEARCH CONTINUES

**Thank you to The Battle Within Foundation for your continued support of MMRI's PTSD research.**



The Battle Within Foundation graciously continues to support and invest in MMRI's PTSD research, led by Dr. Chase Kessinger.

Their generous contribution, which began in May 2022, helped purchase the fundamental instrumentation necessary to undertake new research in the field of PTSD.

**"This funding will help establish the model and preliminary data needed to generate a competitive extramural funding proposal**

**for granting agencies such as the National Institutes of Health and others,"** said Dr. Kessinger.

Dr. Kessinger's work looks into the role that neuroinflammation may play in the development and persistence of PTSD symptoms.

We are thankful to The Battle Within Foundation for their belief in our mission and powering our PTSD research.

## Join MMRI's Cornerstone Society

### What is the Cornerstone Society?

The MMRI Cornerstone Society allows you to be honored for any of your planned gifts now. We want the pleasure of honoring your legacy and thanking you for your generosity.

### Why join this elite society?

Thoughtful planned gifts such as a bequest in a will or trust, retirement plan named beneficiaries, charitable gift annuities and others, demonstrate an outstanding commitment on the part of our supporters to the future of our scientific research. In addition, these gifts often provide significant tax advantages, while allowing MMRI to plan with confidence.

The MMRI Cornerstone Society, is an opportunity to recognize and thank those that have made a personal, long-term commitment to the mission of MMRI. For more information or to discuss your planned giving options, contact us at [development@mmri.edu](mailto:development@mmri.edu).

A testimony from a cornerstone member:  
Frank R. Williams



“Planned giving to MMRI through the Cornerstone Society, gives you the assurance that your gift will be used to advance the groundbreaking work of our dedicated scientists into many of our complex diseases,” said Williams. “For me, my planned contributions are a way of giving back to my community in a long-term plan so I know my donation will be used to benefit MMRI long into the future!”

## Cornerstone Society Members as of Year-End 2023

Arthur E. Bowen  
Gill R. Calderon  
Joyce A. Clark  
George Filippidis<sup>4</sup>  
John W. Foster  
Bruce H. Gleason  
Richard B. Gondiosa

Carolyn Gray  
Jean Gray  
Peter R. Gray,<sup>1</sup> MD, Ph.D., FACC  
Paul<sup>1</sup> & Joyce Guerrero, CMR  
David C. Hochman  
Matthew C. Jenison  
Don Jensen

LaVerne Poussaint  
Sheldon B. Richman,<sup>1</sup> Esq.  
Jonathan B. Rossi  
Cheryl M. Roy  
David F. Schneeweiss,<sup>1</sup> MBA  
Patricia J. White  
Frank R. Williams<sup>1</sup>

**Legend of Footnotes:**  
Board of Directors<sup>1</sup>

MMRI Staff/Employee<sup>2</sup>

Community Advisory Committee<sup>3</sup>

Trustee of Hall and Home<sup>4</sup>

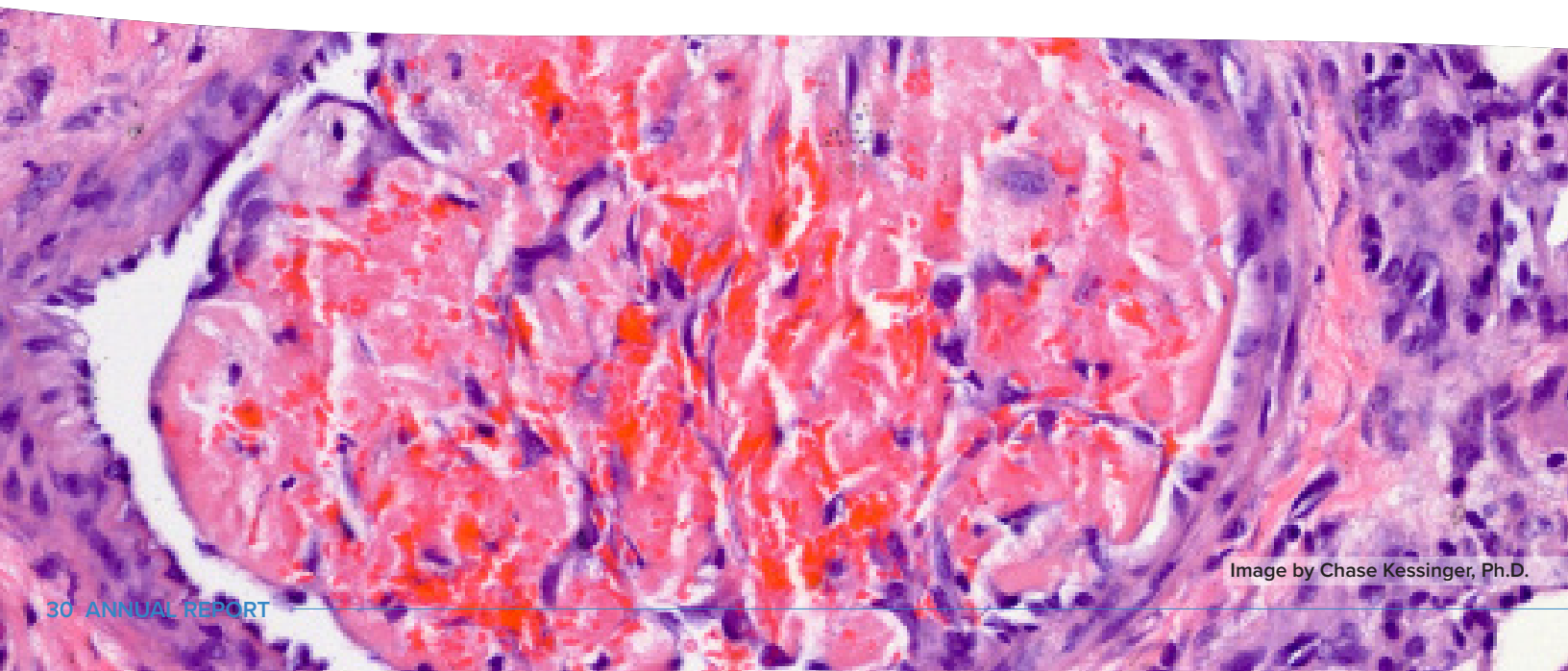


Image by Chase Kessinger, Ph.D.

## FIRST ANNUAL GOLF CLASSIC RAISES \$88,000

On Monday, August 28, 2023, MMRI hosted its first annual charitable golf tournament at the Yahnundasis Golf Club, New Hartford, New York, in honor of its 65th anniversary.



Team enjoying golf

Twenty-five foursomes played 18 holes of golf, captain and crew style, while competing for the best overall score, longest drive (men's, women's and senior's) and closest to the pin (men's and women's). Players also had access to the driving range and enjoyed a cocktail hour followed by dinner and an awards presentation.

With the help of its sponsors and players, the inaugural tournament raised \$88,000 for MMRI.

“The event would not have been possible without the generosity of our sponsors and foursomes,” said Stephen Izzo, principal development officer at MMRI. “We are truly grateful for their unwavering support.”



Pictured here are Maria I. Kontaridis, Ph.D., Robert Hewson, DPM, Millie Occhionero, presenting the check for \$88,000 for this year's MMRI golf tournament.



### Heidelberg Bread Company Hosts Fundraiser for MMRI

Boyd Bissell, the founder of the popular bakery, Heidelberg Bread Company, and a member of the MMRI Community Advisory

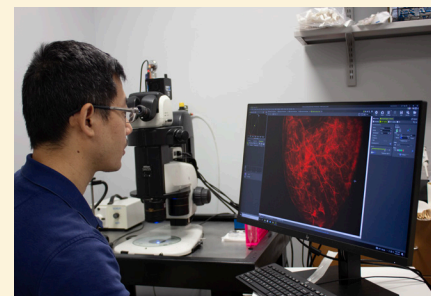
Committee (CAC), hosted a fundraiser on Saturday, April 15, 2023, at the Heidelberg Great Room on Route 28 in Herkimer, New York, in support of MMRI. The event raised more than \$15,000. Mr. Bissell is not only a pillar in the local community, recognized for his exemplary philanthropic work, but also shares an appreciation for cardiovascular health.

Thank you, Mr. Bissell and supporters of this fundraiser, for your dedication to MMRI and our research efforts!

### Griffin Charitable Foundation Donates \$71,000

A \$71,000 grant from the Griffin Charitable Foundation, based in Rome, New York, was generously provided to MMRI to purchase a new state-of-the-art microscope for imaging three-dimensional tissues and cells.

The Griffin Charitable Foundation is a not-for-profit organization that supports select organizations in the community. For more than a century, the Griffin family has been a cornerstone in Central New York with family members involved in philanthropy and establishing various private charitable foundations to support the local community.



Dr. Lin using microscope



# '23 Honor Roll

Your donation makes a difference! Thanks to gifts made from January 1, 2023, to December 31, 2023, we have been able to further our mission to advance the health and quality of life for all humankind.

**Thank you for your dedicated support!**

## PLANNED GIFT AND ESTATE CONTRIBUTIONS

### \$100,000 and up

Joseph L. Chen Family Trust  
Donald F. Braun  
Gerald L. Griffith  
Dolores J. Jennings  
Duff M. Neely  
Robert J. Peyser

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Douglas L. Rehlaender Trust  
The Melvin Roth C.R.A.T. Trust

## ORGANIZATIONAL CONTRIBUTIONS

### \$200,000 and up

Lupus & Allied Diseases Association,  
Inc.

### \$100,000-\$199,999

The Battle Within Foundation

### \$50,000-\$99,999

Griffin Charitable Foundation

### \$25,000-\$49,999

Ingram Family Foundation  
Kane Lodge Foundation, Inc.  
M&T Bank/Partners Trust Bank  
Charitable Fund of The  
Community Foundation  
Onondaga Masonic District Charities

### \$10,000-\$24,999

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Connecticut Freemasons Foundation,  
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The Fountainhead Group, Inc.  
Rainbow Charities of N.Y. Inc.  
RAM Medical Research Foundation  
The Seventh District Foundation, Inc.  
Townsquare Media  
UpMobility Foundation  
Wildermuth Memorial Foundation

### \$5,000-\$9,999

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Coldwell Banker Faith Properties, Inc.  
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Corporation  
Reliance Lodge #776 F. & A.M.  
Second Kings Charities Fund, Inc.  
Sixth Masonic District Association of  
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Utica Lodge #47 F. & A.M.

### \$1,000-\$4,999

Adirondack Foundation - Raquette  
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Alera Group Company  
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Colonial MA  
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Olive Branch Lodge #40  
Pyramid Lodge #490  
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Utica Glass Company

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Calabria Coffee  
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Paul Altenburg	Kenneth Cheyne	George <sup>4</sup> & Vicki Filippidis	William Henderson	William Lennon	Stephen Parlow	Beverly Schloss	Benedetto & Geraldine Vitullo
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Wayne Anderson	Dennis Breheny	Ivan Cole	Rodney Dow	Augustine F. Garbo	Beverly A. Harrington	James Kalnins	Charles Lesser
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George Backus	Leon & Marilyn Bulriss	John Connell	Jan Duller	Erik M. Geehern	Richard Henry	William Kellogg	Walter Lilling
John Bailey	Charles Bunke	William Connors	Ronald Dunn	Andrew Gelbman	Jon Heppner	Douglas Kelly	Jeremy Lindauer
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Gene Nitschke	John Pufpaff	David Schulz	Craig R. Stevens				
		Herbert Schutt	Richard Stevenson				

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Courtney Hanrahan  
Joyce Hanrahan

### In Honor of Wilbur Albright

Jeannene Albright

### In Memory of Lawrence G. Alderdice

Carol Alderdice

### In Honor of Allemania Lodge #740's 150th Anniversary

Allemania Lodge # 740

### In Memory of John Beck

Joseph Oriente

### In Memory of Leonard Berger

Valley of the Hudson, AASR NMJ

### In Honor of Boyd Bissell

Louis Leogrande

### In Honor of Mike Blostein

Dana Cerone

### In Memory of Anthony Boccabella

Catherine Boccabella

### In Memory of Stephen Bogardus

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### In Memory of Terry Buesser

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### In Honor of Laurence & Elaine Cerny

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### In Memory of Paul Chappell

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Menzer & Rena Doud

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Joyce Ann Clark

### In Honor of Judi Cohen

Robert Cohen

### In Memory of Francis A. Combar

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MMRI's exclusive donor club!

MMRI was established in 1958, and since then, our research initiatives have expanded to cover areas such as cardiovascular disease, autoimmunity and neurocognitive health.

Become a part of the 1958 Club today to contribute to our mission and research efforts. Your generous monthly donation of \$19.58 will assist MMRI scientists in making a lasting impact with innovative medical research. As a member of our exclusive donor club, you will be honored with this one-of-a-kind pin!

To become a member or to learn more, visit [mmri.edu/1958-club](http://mmri.edu/1958-club).



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## Update From our Finance Director



To the Grand Lodge,

MMRI continued the process in 2023 to position itself as a widely-known and financially independent research laboratory. While some parts of this journey have been completed, such as infrastructure reconstruction and establishment of commercial ventures, many more are continuing through 2024 and beyond. During 2023, MMRI achieved several milestones in its strategic plan as it reduced its outstanding debt by 50%, achieved a 22% increase in research grant funding while holding cost increases to only 9%, and claimed an eligible 800k in federal tax credits.

Although this process included many successes, it also provided some hurdles. The most significant hurdle was maintaining the cash flow necessary to accomplish MMRI's capital goals while maintaining operations. By paying off \$6M of outstanding debt, the excess funds required to be held as collateral were also freed up. This provided additional capital to be divested from the market into its investment in the holding company, Three Pillars Innovation, Inc. (TPI). As of Sunday, December 31, 2023, \$3.3M has been invested in TPI, which owns, among other things, 50 percent of a testing laboratory established in Utica, New York in 2022. This testing laboratory has recently been fully permitted by the New York State Office of Cannabis Management (OCM) to perform all required testing on cannabis products as part of the state's legal recreational use market. While this is one of very few fully permitted testing labs in the state, the OCM has not yet licensed enough retailers to be able to sell all the cannabis products that have been produced, thereby limiting testing demand. This ongoing delay by the state in completing the establishment of a fully operational market has been a significant obstacle, but it is deemed temporary. The number of retailers will only increase from this point, but the speed at which that happens remains to be seen. Despite the unknowns, the future for the venture remains very bright.

In addition to its commercial ventures, MMRI is growing in numbers and has added several new researchers and staff to its roster. With additional researchers comes the expectation of additional research grant awards that span multiple years. MMRI is also expecting disbursements of approximately \$3.6M from New York's Empire State Development, as it achieves the grant requirements in 2024. These funds will provide the cash flow necessary until the researchers obtain new grants and before the commercial ventures begin producing profits that will support MMRI operations.

Another significant investment made in 2023 is related to development and philanthropic efforts. MMRI increased its marketing, development and administrative staff and greatly improved public awareness of the Institute through social media, local events and collaboration with other community leaders. The year 2024 will likely see further fundraising and brand awareness initiatives such as a revamped website and establishment of a capital campaign, which will facilitate MMRI's continued growth.

In conclusion, while 2023 had many accomplishments, it was not without some struggles. We believe 2023 can be seen as a "springboard into the future". The long-term initiatives that began prior to December 31, 2023, will certainly bear fruit in future years. All the foundational blocks have been laid, and the bricks toward creating a world-class, independent and financially sustainable MMRI will continue to be built upon each other, as only true Masons, and those who believe in them, can do.

Sincerely,

Lisa Cooper, CPA  
Finance Director

## INDEPENDENT AUDITORS' REPORT

The Board of Directors  
Masonic Medical Research Laboratory,  
dba Masonic Medical Research Institute

### Report on the Audit of the Financial Statements

#### Opinion

We have audited the consolidated balance sheets of Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute) as of December 31, 2023 and 2022, and the related consolidated statements of activities, functional expenses, and cash flows for the years then ended, and the related notes to the consolidated financial statements.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Institute as of December 31, 2023 and 2022, and the changes in its net assets and cash flows for the years then ended, in accordance with accounting principles generally accepted in the United States of America (GAAP).

#### Basis for Opinion

We conducted our audits in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the Institute and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audits. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

#### Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with GAAP, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the Institute's ability to continue as a going concern for one year after the date the financial statements are issued.

#### Auditors' Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the Institute's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control related matters that we identified during the audit.

#### Supplementary Information

Our audit was conducted for the purpose of forming an opinion on the financial statements as a whole. The accompanying schedule of expenditures of federal awards, as required by Title 2 U.S. *Code of Federal Regulations* Part 200, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance) is presented for purposes of additional analysis and is not a required part of the financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. The information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or to the financial statements themselves, and other additional procedures in accordance with GAAS. In our opinion, the schedule of expenditures of federal awards is fairly stated, in all material respects, in relation to the financial statements as a whole.

### Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated March 29, 2024 on our consideration of the Institute's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, grant agreements, and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Institute's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Institute's internal control over financial reporting and compliance.



March 29, 2024

### MASONIC MEDICAL RESEARCH INSTITUTE

#### Consolidated Balance Sheets

December 31,	2023	2022
<b>Assets</b>		
<b>Current assets:</b>		
Cash	\$ 495,444	\$ 659,701
Receivables (Note 2)	2,302,085	865,471
Prepaid expenses and other assets	328,566	261,151
	<b>3,126,095</b>	<b>1,786,323</b>
Investments (Note 3)	16,206,448	26,618,635
Split-interest agreements (Note 4)	5,855,313	5,556,562
Property and equipment, net (Note 5)	15,012,669	16,421,328
Cash value of life insurance	1,138,415	1,097,262
Interest in Analytical Testing Center of Central New York LLC (Note 6)	1,931,326	309,377
	<b>\$ 43,270,266</b>	<b>\$ 51,789,487</b>
<b>Liabilities and Net Assets</b>		
<b>Current liabilities:</b>		
Short-term borrowings (Note 7)	\$ 6,178,308	\$ -
Current portion of long-term debt (Note 8)	-	11,943,158
Accounts payable	366,642	168,599
Accrued expenses	378,403	332,932
Deferred revenue	5,000	96
	<b>6,928,353</b>	<b>12,444,785</b>
Charitable gift annuities (Note 4)	148,977	135,225
<b>Net assets:</b>		
Without donor restrictions	22,582,566	25,901,816
With donor restrictions (Note 9)	13,610,370	13,307,661
	<b>36,192,936</b>	<b>39,209,477</b>
	<b>\$ 43,270,266</b>	<b>\$ 51,789,487</b>



**Consolidated Statements of Activities**

For the years ended December 31,	2023	2022
<b>Net assets without donor restrictions:</b>		
Revenues, gains and support:		
Contributions:		
Masonic Brotherhood Foundation, Inc.	\$ 77,070	\$ 56,806
Legacies and bequests	1,392,119	336,489
Grants	2,481,031	1,990,765
Other	470,321	359,329
Employee Retention Credits (Note 2)	831,717	-
Investment earnings (losses), net	1,007,105	(1,693,173)
Analytical Testing Center of Central New York allocations	(609,081)	(33,806)
Other income	83,087	9,015
Net assets released from restrictions	1,367,629	649,734
Total revenues, gains, and support	<b>7,100,998</b>	<b>1,675,159</b>
Expenses:		
Program services - research and education	7,088,559	6,343,210
Management and general	2,198,224	2,260,152
Public relations and development	1,133,465	720,139
Total expenses	<b>10,420,248</b>	<b>9,323,501</b>
<b>Change in net assets without donor restrictions</b>	<b>(3,319,250)</b>	<b>(7,648,342)</b>
<b>Net assets with donor restrictions:</b>		
Contributions	375,239	305,330
Change in value of split-interest agreements	418,665	(1,023,705)
Investment earnings (losses), net	876,434	(543,694)
Net assets released from restrictions	(1,367,629)	(649,734)
<b>Change in net assets with donor restrictions</b>	<b>302,709</b>	<b>(1,911,803)</b>
<b>Change in net assets</b>	<b>(3,016,541)</b>	<b>(9,560,145)</b>
Net assets - beginning	39,209,477	48,769,622
Net assets - ending	<b>\$ 36,192,936</b>	<b>\$ 39,209,477</b>

See accompanying notes.

**Consolidated Statements of Functional Expenses**

For the years ended December 31,	2023				2022			
	Program Services Research and Education	Supporting Services Management and General	Supporting Services Public Relations and Development	Total	Program Services Research and Education	Supporting Services Management and General	Supporting Services Public Relations and Development	Total
Salaries	\$ 2,686,492	\$ 1,097,883	\$ 519,318	\$ 4,303,693	\$ 2,370,845	\$ 1,068,666	\$ 363,059	\$ 3,802,570
Payroll taxes and fringe benefits	629,390	270,222	139,286	1,038,898	599,948	285,737	97,647	983,332
Total salaries and related expenses	<b>3,315,882</b>	<b>1,368,105</b>	<b>658,604</b>	<b>5,342,591</b>	<b>2,970,793</b>	<b>1,354,403</b>	<b>460,706</b>	<b>4,785,902</b>
Research expenses	1,060,605	-	-	1,060,605	894,869	-	-	894,869
Buildings and grounds operations	206,875	61,478	21,008	289,361	201,935	51,375	7,050	260,360
Equipment and repairs	119,827	15,178	7,156	142,161	90,581	19,758	1,730	112,069
Office expenses	111,833	85,885	80,713	278,431	82,771	86,658	54,025	223,454
Conferences, travel and meals	81,073	58,080	69,320	208,473	112,019	46,788	29,187	187,994
Professional fees and outside services	6,071	303,532	3,680	313,283	10,631	380,196	46,389	437,216
Publicity, promotion and sponsorships	645	14,676	162,985	178,306	18,134	5,804	82,918	106,856
Insurance	96,672	47,612	5,296	149,580	69,453	54,123	2,461	126,037
Depreciation	1,582,849	132,937	64,554	1,780,340	1,524,509	154,169	18,970	1,697,648
Interest	505,562	96,228	53,217	655,007	362,496	95,132	12,022	469,650
Gain on disposal of property and equipment	-	-	-	-	-	(11,000)	-	(11,000)
Miscellaneous	665	14,513	6,932	22,110	5,019	22,746	4,681	32,446
	<b>\$ 7,088,559</b>	<b>\$ 2,198,224</b>	<b>\$ 1,133,465</b>	<b>\$ 10,420,248</b>	<b>\$ 6,343,210</b>	<b>\$ 2,260,152</b>	<b>\$ 720,139</b>	<b>\$ 9,323,501</b>

**Consolidated Statements of Cash Flows**

For the years ended December 31,	2023	2022
<b>Operating activities:</b>		
Change in net assets	\$ (3,016,541)	\$ (9,560,145)
Adjustments to reconcile change in net assets to net cash flows from operating activities:		
Depreciation	1,780,340	1,697,648
Gain on disposal of property and equipment	-	(11,000)
Net realized and unrealized (gains) loss on investments	(1,220,230)	3,087,358
(Gain) loss on beneficial interest in split-interest agreements	(284,999)	1,376,555
Increase in cash value of life insurance	(41,153)	(17,504)
Loss from interest in Analytical Testing Center of Central New York	609,081	33,806
Changes in other operating assets and liabilities:		
Receivables	(1,436,614)	2,933,954
Prepaid expenses and other assets	(67,415)	(103,159)
Accounts payable	198,043	(516,049)
Accrued expenses	45,471	45,172
Deferred revenue	4,904	(12,505)
<b>Net operating activities</b>	<b>(3,429,113)</b>	<b>(1,045,869)</b>
<b>Investing activities:</b>		
Property and equipment purchases	(371,681)	(1,550,621)
Proceeds from sales of investments	24,832,080	15,916,292
Purchases of investments	(13,199,663)	(13,019,845)
Member contributions to Analytical Testing Center of Central New York	(2,231,030)	(343,183)
<b>Net investing activities</b>	<b>9,029,706</b>	<b>1,002,643</b>
<b>Financing activities:</b>		
Net proceeds from short-term borrowings	6,178,308	-
Payments on long term debt	(11,943,158)	-
<b>Net financing activities</b>	<b>(5,764,850)</b>	<b>-</b>
Net change in cash	(164,257)	(43,226)
Cash - beginning	659,701	702,927
Cash - ending	\$ 495,444	\$ 659,701

**Notes to Consolidated Financial Statements****1. Summary of Significant Accounting Policies:****Organization:**

Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute) is a nonprofit organization located in Utica, New York, dedicated to improving the health and quality of life for all humankind. The Institute's primary mission is to conduct high-quality, basic biomedical research aimed at generating knowledge and information necessary for development of the medical cures and treatments of tomorrow.

The accompanying financial statements include the accounts of the Institute and its controlled subsidiary Three Pillars Innovation, Inc. (TPI). All significant intercompany accounts and transactions have been eliminated in the accompanying financial statements.

TPI, a for-profit corporation, was established in 2022 as a holding company to invest in various entrepreneurial ventures with the goal of creating sustainable cash flow to the Institute.

**Subsequent Events:**

The Institute has evaluated events and transactions for potential recognition or disclosure through March 29, 2024, the date the financial statements were available to be issued.

**Cash:**

Cash in financial institutions may exceed insured limits at various times during the year and subject the Institute to concentrations of credit risk.

**Investments:**

Investments represent marketable securities stated at fair value on a recurring basis as determined by quoted prices in active markets. Investment securities are exposed to interest rate, market, and credit risks. Due to the level of risk associated with certain investment securities and the level of uncertainty related to changes in the value of investment securities, it is at least reasonably possible that changes in values in the near term could materially affect the amounts reported in the accompanying financial statements.

**Split-Interest Agreements:**

The Institute receives contributions in the form of split-interest agreements which consist primarily of charitable gift annuities, charitable remainder trusts, and beneficial interests in perpetual trusts. The assets are invested in marketable securities and are stated at fair value as determined by quoted prices in active markets. Distributions from the trusts are made periodically, and represent unrestricted investment income.

The Institute administers a charitable gift annuity plan whereby donors may contribute assets in exchange for the right to receive a fixed dollar annual return during their lifetimes. A portion of contributed assets is considered to be a charitable contribution for income tax purposes for the donor. The difference between the amount provided for the gift annuity and the liability for future payments, determined on an actuarial basis, is recognized as a contribution with donor restrictions at the date of the gift. Upon the death of the annuitant (or last joint annuitant), the remaining net assets are available for use by the Institute. State mandated reserves related to charitable gift annuity agreements are maintained at the required level.

The Institute is a remainder beneficiary in charitable trusts administered by other trustees. Pursuant to the agreements, assets are recorded at the present value of the estimated future benefits to be received based on the life expectancy of the income beneficiaries using appropriate discount rates. Subsequent changes in value are recorded as change in value of split-interest agreements in the statements of activities.

The Institute is a beneficiary of perpetual trusts administered by independent organizations. Under the terms of the trusts, the Institute has irrevocable rights to receive portions of the income earned on the trust assets in perpetuity.

**Property and Equipment:**

Property and equipment is stated at cost or fair market value at the date of donation, net of accumulated depreciation. Depreciation is computed by the straight-line method over estimated service lives.

## Net Assets:

The Institute reports information regarding its financial position and activities according to two classes of net assets: net assets without donor restrictions and net assets with donor restrictions.

Net assets with donor restrictions include those whose use has been limited by donors to a specific time period, purpose, or those to be maintained in perpetuity by the Institute.

## Contributions:

Contributions, including unconditional promises to give, are reported at fair value at the date the contribution is made. Contributions are recorded as restricted if they are received with donor stipulations that limit their use. When a donor restriction expires, net assets with donor restrictions are reclassified as net assets without donor restrictions and reported in the statements of activities as net assets released from restrictions. Donor restricted contributions whose restrictions are met within the same year as received are reported as contributions without donor restrictions in the accompanying statements of activities.

Unconditional promises to give that are expected to be collected within one year are recorded as contributions receivable at their net realizable value. Unconditional promises to give that are expected to be collected in future years are recorded at the present value of estimated future cash flows. The discounts on those amounts are computed using an appropriate interest rate applicable to the year in which the promise is received. Amortization of the discount is included in contribution revenue.

The Institute also receives grants from governments and nonprofit organizations. These conditional contributions are recognized as revenue when allowable expenditures are incurred or other grantor conditions are met. The grant awards and reimbursements are subject to various compliance and financial audits by the funding source. Management believes no significant adjustments to recognized amounts are necessary.

## Functional Expense Allocation:

The Institute's costs of providing its various programs and activities have been summarized on a functional basis in the statements of functional expenses. Accordingly, certain costs have been allocated among the programs and supporting services benefited. Those costs include depreciation, which is allocated on an estimated square footage basis, and certain other expenses allocated based on employee time and effort.

## Tax Status:

The Institute is a 501(c)(3) corporation generally exempt from income taxes under Section 501(a) of the Internal Revenue Code.

TPI is taxed as a C-corporation and files separate federal and state corporation tax returns. TPI has estimated net operating loss carryforwards of approximately \$565,000. No tax benefits have been reported in the financial statements.

## Use of Estimates:

The preparation of financial statements in accordance with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates.

## 2. Receivables:

	2023	2022
Contributions:		
Grants	\$ 649,908	\$ 291,753
Others	749,960	571,990
Employee Retention Credits	831,717	-
Other receivables	70,500	1,728
	<u>\$ 2,302,085</u>	<u>\$ 865,471</u>

During 2023, the Institute determined it qualified for federal government assistance of \$831,717 through Employee Retention Credit (ERC) provisions under the Consolidated Appropriation Act of 2021 in response to the COVID-19 pandemic, declared by the World Health Organization in February 2020. Although management believes all ERC eligibility requirements have been met, the Institute's payroll tax returns which claimed the ERCs, are subject to audit for a period of five years.

## 3. Investments:

	2023	2022
Cash and cash equivalents	\$ 74,802	\$ 1,053,981
Mutual funds	2,617,544	3,668,205
Equity securities	9,378,076	20,772,775
U.S. government securities	4,136,026	1,123,674
	<u>\$ 16,206,448</u>	<u>\$ 26,618,635</u>

The following summarizes investment return and its classification in the consolidated statements of activities:

	2023	
	Without Donor Restrictions	With Donor Restrictions
Dividends and interest	\$ 333,294	\$ 228,575
Net realized gains	1,213,443	507,171
Net unrealized gains (losses)	(641,072)	140,688
Distributions from other perpetual trust assets	101,440	-
	<u>\$ 1,007,105</u>	<u>\$ 876,434</u>

	2022	
	Without Donor Restrictions	With Donor Restrictions
Dividends and interest	\$ 566,316	\$ 195,364
Net realized gains	145,407	37,657
Net unrealized losses	(2,506,336)	(776,715)
Distributions from other perpetual trust assets	101,440	-
	<u>\$ (1,693,173)</u>	<u>\$ (543,694)</u>

## 4. Split-Interest Agreements:

	2023	2022
Charitable gift annuities	\$ 332,777	\$ 292,359
Beneficial interest in charitable remainder trusts	3,646,556	3,513,775
Other perpetual trust assets	1,804,907	1,683,390
Pooled income funds	71,073	67,038
	<u>\$ 5,855,313</u>	<u>\$ 5,556,562</u>

Liabilities associated with the above charitable gift annuity assets totaled \$148,977 and \$135,225 at December 31, 2023 and 2022. Distributions received from the agreements totaled \$265,806 and \$191,563 in 2023 and 2022.

## 5. Property and Equipment:

	2023	2022
Buildings and improvements	\$ 18,699,499	\$ 18,642,999
Equipment	8,362,027	8,049,961
Furniture and fixtures	189,832	189,832
Vehicles	43,326	43,326
	<u>27,294,684</u>	<u>26,926,118</u>
Less accumulated depreciation	12,282,015	10,504,790
	<u>\$ 15,012,669</u>	<u>\$ 16,421,328</u>

## 6. Interest in Analytical Testing Center of Central New York LLC:

TPI is a 50% member of Analytical Testing Center of Central New York LLC (ATCCNY), a limited liability company operating a cannabis testing laboratory in New York State. TPI's membership in ATCCNY is accounted for on the equity method.

Financial position and results of operations of ATCCNY for the year ended December 31, 2023 and 2022 is summarized below:

	2023	2022
Total assets	\$ 1,400,721	\$ 290,071
Total liabilities	\$ 112,280	\$ 14,499
Total equity	\$ 1,288,441	\$ 275,572
Total revenue	\$ 20,615	\$ -
Total expenses	\$ 1,238,776	\$ 67,611
Excess of expenses over revenue	\$ (1,218,161)	\$ (67,611)
Member contributions	\$ 2,231,030	\$ 343,183

## 7. Short-Term Borrowings:

Beginning in July 2023, the Institute has available a margin priority investment line of credit, with maximum borrowings based on advance rate maximum loan percentages, security types, and market values, as defined in the agreement. Interest on this line is payable at the Wall Street Journal Broker Call rate less 50 basis points (6.75% at December 31, 2023), and the line is secured by pledged investments totaling \$8,109,029 at December 31, 2023. Amounts outstanding at December 31, 2023 totaled \$6,178,308.

## 8. Long-Term Debt:

Through 2023, the Institute had available a \$12,000,000 bank revolving line note to finance renovations of its building completed in 2020. The note carried interest at 1% below prime and was secured by specific Institute investments valued at \$16,183,000 at December 31, 2022. During 2023, the Institute repaid all outstanding amounts and the line was closed. At December 31, 2022, \$11,943,158 was outstanding.

## 9. Net Assets with Donor Restrictions:

Net assets with donor restrictions are for the following purposes or periods:

	2023	2022
Subject to expenditure for research or other purposes	\$ 3,224,570	\$ 3,117,194
Subject to the passage of time	3,946,529	3,803,758
Other perpetual trust assets	1,804,907	1,683,390
Subject to the Institute's spending policy and appropriation:		
Investment in perpetuity (including amounts above the original gift value of \$3,067,271 at December 31, 2023 and \$3,007,271 in 2022), which, once appropriated, is expendable to support research (see Note 10)	4,634,364	4,703,319
<b>Total net assets with donor restrictions</b>	<b>\$ 13,610,370</b>	<b>\$ 13,307,661</b>

## 10. Endowment Assets:

The Institute's restricted endowment assets arise from donor-restricted endowments invested in perpetuity. The Institute has adopted investment and spending policies for endowment assets that attempt to provide returns sufficient to address the purposes of the assets over the long-term. The Institute seeks to distribute up to 5% of total endowment market value annually, while maintaining the purchasing power of the endowment assets over the long-term.

The Institute has interpreted the New York Prudent Management of Institutional Funds Act (NYPMIFA) as requiring the preservation of the fair value of the original donor restricted endowment gift as of the gift date, absent explicit donor stipulations to the contrary. As a result of this interpretation, the Institute classifies as perpetual endowment (a) the original value of gifts donated to the perpetual endowment, (b) the original value of subsequent gifts to the perpetual endowment, and (c) accumulations to the perpetual endowment made in accordance with the direction of a donor gift instrument at the time the accumulation is added to the fund.

Investment earnings of non-trusteed perpetual endowment funds are monitored and appropriated for expenditure by the Institute in a manner consistent with the standard of prudence prescribed by NYPMIFA. In accordance with NYPMIFA, the Institute considers the following factors to appropriate or accumulate donor-restricted endowment funds:

- Duration and preservation of the fund
- Purposes of the Institute and the fund

- General economic conditions
- Possible effects of inflation and deflation
- Expected total return from income and appreciation of investments
- Other Institute resources
- When circumstances would otherwise warrant, alternatives to expenditure of the endowment fund, giving due consideration to the effect that such alternatives may have on the Institute
- Investment policy of the Institute

Investment gains (losses) related to the donor-restricted endowment are reported as increases (decreases) to net assets with donor restrictions until appropriated and expended in accordance with the Institute's spending policy. The Institute's restricted endowment assets activity for the years ended December 31, 2023 and 2022 is as follows:

	2023	2022
Endowment assets – beginning balance	\$ 4,703,319	\$ 5,031,446
Investment gains (losses), net of custodian fees	430,686	(328,127)
Transfers	60,000	-
Appropriated	(559,641)	-
<b>Endowment assets – ending balance</b>	<b>\$ 4,634,364</b>	<b>\$ 4,703,319</b>

## 11. Retirement Plan:

The Institute sponsors a defined-contribution retirement plan covering substantially all full-time employees. The plan allows for discretionary employer matching contributions of up to 10% of salaries. The Institute's contributions to the plan totaled \$277,236 and \$226,925 in 2023 and 2022.

## 12. Related Party Transactions:

The Institute receives voluntary contributions of New York State Masons through Masonic Brotherhood Foundation, Inc. In addition, other Masonic organizations throughout New York State contribute directly to the Institute. During the years ended December 31, 2023 and 2022, the Institute received contributions of \$77,070 and \$56,806 for operations through Masonic Brotherhood Foundation, Inc.

In addition, at December 31, 2023 and 2022, Masonic Brotherhood Foundation, Inc. held in a custodial account \$799,425 and \$709,574 of bequests on behalf of the Institute. Pursuant to accounting guidance, the investments remain as part of the foundation's net assets with all investment income disbursed to the Institute for its operations. Accordingly, such bequests are not recorded in the Institute's financial statements. Disbursements of investment income made to the Institute for 2023 and 2022 totaled \$29,601 and \$24,437.

The Institute is party to an agreement with Grand Lodge of Free and Accepted Masons of the State of New York (the Grand Lodge). The Grand Lodge provides services to promote the Institute's fundraising objectives for an annual fee of \$1 per Grand Lodge member through December 31, 2023. Annual expenses totaling \$35,696 and \$29,440 were incurred for the years ended December 31, 2023 and 2022. The Grand Lodge also manages contributions (including estate gifts) received by the Masonic Brotherhood Foundation, Inc. to benefit the Institute and assesses a fee of 10% for processing such items. Fees charged in 2023 and 2022 totaled \$43,859 and \$8,396 and are included in publicity, promotion and sponsorships on the accompanying statements of functional expenses.

The Institute's facilities are located on land owned by Masonic Care Community (MCC). The Institute pays a \$1 annual fee to the trustees of MCC for use of this land. Utilities and ground maintenance expenses related to the facilities are charged by MCC and totaled \$167,436 and \$188,959 for 2023 and 2022 and amounts totaling \$49,728 and \$27,248 are included in accounts payable on the accompanying balance sheets at December 31, 2023 and 2022.

## 13. Cash Flows Information:

Net cash flows from operating activities reflect cash payments for noncapitalized interest totaling \$655,007 and \$469,650 for the years ended December 31, 2023 and 2022.

## 14. Financial Assets Available for Operations:

The Institute obtains financial assets generally through grants, contributions and fundraising efforts. The financial assets are acquired throughout the year to help meet the Institute's cash needs for general expenditures. The Institute's financial assets available within one year of the balance sheet date to meet cash needs for general expenditures consist of the following at December 31, 2023 and 2022:

	2023	2022
Cash	\$ 495,444	\$ 659,701
Receivables	2,302,085	865,471
Investments	16,206,448	26,618,635
Less: investments restricted to expenditure for research or other purposes	(3,224,570)	(3,117,194)
Less: investments subject to the Institute's spending policy and appropriation	(4,634,364)	(4,703,319)
Less: investments held as collateral for debt	(8,109,029)	(16,182,975)
	<b>\$ 3,036,014</b>	<b>\$ 4,140,319</b>

## 15. Risks and Uncertainties:

The Institute is involved in legal proceedings which, in the opinion of management, will not have a material adverse impact upon the financial position of the Institute.

**Supplementary Information**  
**Schedule of Expenditures of Federal Awards**

For the year ended December 31, 2023

Federal Grantor/Pass-Through Grantor/Program Title	Assistance Listing Number	Grantor Number	Expenditures
Research and Development Cluster:			
U.S. Department of Defense:			
Direct award:			
Military Medical Research and Development	12.420	LR200032	\$ 227,781 <sup>1</sup>
U.S. Department of Veteran Affairs:			
Direct award:			
Intergovernmental Personnel Act	64.XXX	n/a	2,124
Direct awards:			
Cardiovascular Diseases Research	93.837	140187	124,259
Cardiovascular Diseases Research	93.837	146810	751,535
			<u>875,794</u>
Passed through The Brigham and Women's Hospital, Inc.:			
Cardiovascular Diseases Research	93.837	115141	61,156
Passed through Regents of the University of Michigan:			
Blood Diseases and Resources Research	93.839	144550	38,932
Direct awards:			
Arthritis, Musculoskeletal and Skin Diseases Research	93.846	079085	206,124 <sup>2</sup>
Arthritis, Musculoskeletal and Skin Diseases Research	93.846	801535	178,120
			<u>384,244</u>
Passed through Vanderbilt University Medical Center:			
Arthritis, Musculoskeletal and Skin Diseases Research	93.846	0809014	45,646
Direct award:			
Allergy and Infectious Diseases Research	93.855	170051	283,091 <sup>3</sup>
Passed through the University of Florida:			
Allergy and Infectious Diseases Research	93.855	170075	146,424
Passed through Vanderbilt University Medical Center:			
Biomedical Research and Research Training	93.859	126062	30,354
Total Expenditures of Federal Awards			<u>\$ 2,095,546</u>

<sup>1</sup> Includes subrecipient award of \$24,679<sup>2</sup> Includes subrecipient award of \$121,764<sup>3</sup> Includes subrecipient award of \$38,982
**Notes to Schedule of Expenditures of Federal Awards**
**1. Summary of Significant Accounting Policies:****Basis of Presentation:**

The accompanying schedule of expenditures of federal awards (SEFA) presents the activity of all federal award programs administered by Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute), an entity defined in Note 1 to the Institute's basic consolidated financial statements. Federal awards received directly from federal agencies, as well as federal awards passed through from other governmental agencies, are included on the SEFA.

Expenditures are calculated as required by the Uniform Guidance or the applicable program and do not constitute actual program disbursements.

**Basis of Accounting:**

The Institute uses the accrual basis of accounting for each federal program, consistent with the consolidated financial statements.

The amounts reported as federal expenditures generally were obtained from the appropriate federal financial reports for the applicable programs and periods. The amounts reported in these federal financial reports are prepared from records maintained for each program, which are periodically reconciled with the Institute's financial reporting system.

**Indirect Costs:**

The Institute has elected not to use the 10% de minimis indirect cost rate as allowed under the Uniform Guidance. Rather, the Institute applies an indirect cost rate as permitted by the grant agreements.

**INDEPENDENT AUDITORS' REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH GOVERNMENT AUDITING STANDARDS**

The Board of Directors  
Masonic Medical Research Laboratory,  
dba Masonic Medical Research Institute

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the consolidated financial statements of Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute), which comprise the consolidated balance sheet as of December 31, 2023, and the related consolidated statements of activities, functional expenses, and cash flows, for the year then ended, and the related notes to the financial statements and have issued our report thereon dated March 29, 2024.

**Report on Internal Control over Financial Reporting**

In planning and performing our audit of the financial statements, we considered the Institute's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control. Accordingly, we do not express an opinion on the effectiveness of the Institute's internal control.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A material weakness is a deficiency, or a combination of deficiencies, in internal control such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A significant deficiency is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses or significant deficiencies may exist that have not been identified.

**Report on Compliance and Other Matters**

As part of obtaining reasonable assurance about whether the Institute's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the financial statements. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

**Purpose of this Report**

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Institute's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Institute's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.



March 29, 2024

**INDEPENDENT AUDITORS' REPORT ON COMPLIANCE FOR EACH MAJOR FEDERAL PROGRAM AND ON INTERNAL CONTROL OVER COMPLIANCE REQUIRED BY THE UNIFORM GUIDANCE**

The Board of Directors  
Masonic Medical Research Laboratory,  
dba Masonic Medical Research Institute

**Report on Compliance for Each Major Federal Program**

**Opinion on Each Major Federal Program**

We have audited the compliance of Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute) with the types of compliance requirements described in the OMB *Compliance Supplement* that could have a direct and material effect on each of the Institute's major federal programs for the year ended December 31, 2023. The Institute's major federal programs are identified in the summary of auditors' results section of the accompanying schedule of findings and questioned costs.

In our opinion, the Institute complied, in all material respects, with the compliance requirements referred to above that could have a direct and material effect on each of its major federal programs for the year ended December 31, 2023.

**Basis for Opinion on Each Major Federal Program**

We conducted our audit of compliance in accordance with auditing standards generally accepted in the United States of America (GAAS); the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States; and the audit requirements of Title 2 U.S. *Code of Federal Regulations* Part 200, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance). Our responsibilities under those standards and the Uniform Guidance are further described in the Auditors' Responsibilities for the Audit of Compliance section of our report.

We are required to be independent of the Institute and to meet our other ethical responsibilities, in accordance with relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion on compliance for each major federal program. Our audit does not provide a legal determination of the Institute's compliance with the compliance requirements referred to above.

**Responsibilities of Management for Compliance**

Management is responsible for compliance with the requirements referred to above and for the design, implementation, and maintenance of effective internal control over compliance with the requirements of laws, statutes, regulations, rules and provisions of contracts or grant agreements applicable to the Institute's federal programs.

**Auditors' Responsibilities for the Audit of Compliance**

Our objectives are to obtain reasonable assurance about whether material noncompliance with the compliance requirements referred to above occurred, whether due to fraud or error, and express an opinion on the Institute's compliance based on our audit. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS, *Government Auditing Standards*, and the Uniform Guidance will always detect material noncompliance when it exists. The risk of not detecting material noncompliance resulting from fraud is higher than for that resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Noncompliance with the compliance requirements referred to above is considered material, if there is a substantial likelihood that, individually or in the aggregate, it would influence the judgment made by a reasonable user of the report on compliance about the Institute's compliance with the requirements of each major federal program as a whole.

In performing an audit in accordance with GAAS, *Government Auditing Standards*, and the Uniform Guidance, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material noncompliance, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the Institute's compliance with the compliance requirements referred to above and performing such other procedures as we considered necessary in the circumstances.
- Obtain an understanding of the Institute's internal control over compliance relevant to the audit in order to design audit procedures that are appropriate in the circumstances and to test and report on internal control over compliance in accordance with the Uniform Guidance, but not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control over compliance. Accordingly, no such opinion is expressed.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and any significant deficiencies and material weaknesses in internal control over compliance that we identified during the audit.


**Report on Internal Control Over Compliance**

A deficiency in internal control over compliance exists when the design or operation of a control over compliance does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, noncompliance with a type of compliance requirement of a federal program on a timely basis. A material weakness in internal control over compliance is a deficiency, or a combination of deficiencies, in internal control over compliance, such that there is a reasonable possibility that material noncompliance with a type of compliance requirement of a federal program will not be prevented, or detected and corrected, on a timely basis. A significant deficiency in internal control over compliance is a deficiency, or a combination of deficiencies, in internal control over compliance with a type of compliance requirement of a federal program that is less severe than a material weakness in internal control over compliance, yet important enough to merit attention by those charged with governance.

Our consideration of internal control over compliance was for the limited purpose described in the Auditors' Responsibilities for the Audit of Compliance section above and was not designed to identify all deficiencies in internal control over compliance that might be material weaknesses or significant deficiencies in internal control over compliance. Given these limitations, during our audit we did not identify any deficiencies in internal control over compliance that we consider to be material weaknesses, as defined above. However, material weaknesses or significant deficiencies in internal control over compliance may exist that were not identified.

Our audit was not designed for the purpose of expressing an opinion on the effectiveness of internal control over compliance. Accordingly, no such opinion is expressed.

The purpose of this report on internal control over compliance is solely to describe the scope of our testing of internal control over compliance and the results of that testing based on the requirements of the Uniform Guidance. Accordingly, this report is not suitable for any other purpose.



March 29, 2024

**Schedule of Findings and Questioned Costs**

For the year ended December 31, 2023

**Section I. Summary of Auditors' Results**

Financial Statements

Type of auditors' report issued: *Unmodified*

Internal control over financial reporting:

- Material weakness(es) identified? No
- Significant deficiency(ies) identified? None reported

Noncompliance material to financial statements noted? No

Federal Awards

Internal control over major programs:

- Material weakness(es) identified? No
- Significant deficiency(ies) identified? None reported

Type of auditors' report issued on compliance for major programs: *Unmodified*

Any audit findings disclosed that are required to be reported in accordance with 2 CFR 200.516(a)? No

Identification of major programs:

Name of Federal Program or Cluster	Amount
Research and Development Cluster	\$ 2,095,546

Dollar threshold used to distinguish between type A and type B programs: \$750,000

Auditee qualified as low-risk auditee? Yes

**Section II. Financial Statement Findings**

No findings were reported.

**Section III. Federal Award Findings and Questioned Costs**

No findings were reported.





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