



2021
ANNUAL
REPORT



Cover image taken by Luana Nunes Santos, Postdoctoral Fellow in the Kontaridis Lab of cardiomyocytes derived from human iPSC at day 8 of the protocol of differentiation in 10x magnification. The images are immunostaining for troponin T (in red) and the cell nucleus (in blue).



MMRI

Masonic Medical Research Institute

Unlocking the possibilities...



Mission Statement

The Masonic Medical Research Institute (MMRI) is dedicated to improving the health and quality of life for all humankind. The Institute's 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 development of medical cures and treatments of tomorrow. The Institute 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.



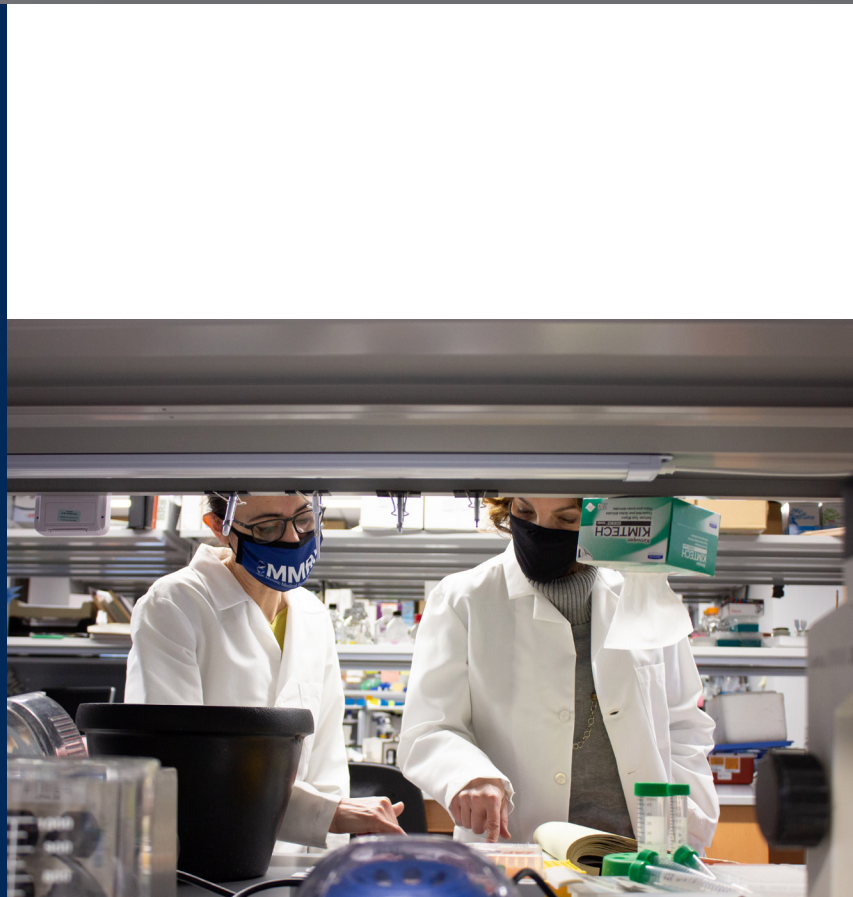
Vision Statement

The Institute'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.



Values

- i) Propelling the understanding of medical science through innovation and groundbreaking research and investigation.
- ii) Fostering teamwork and collaboration, institutionally and worldwide, to combat disease.
- iii) Empowering scientists to take risks and act boldly on ideas with transformative potential.
- iv) Sharing of ideas, data and knowledge to drive biomedical progress, therapeutics and cures.
- v) Building an inclusive community.

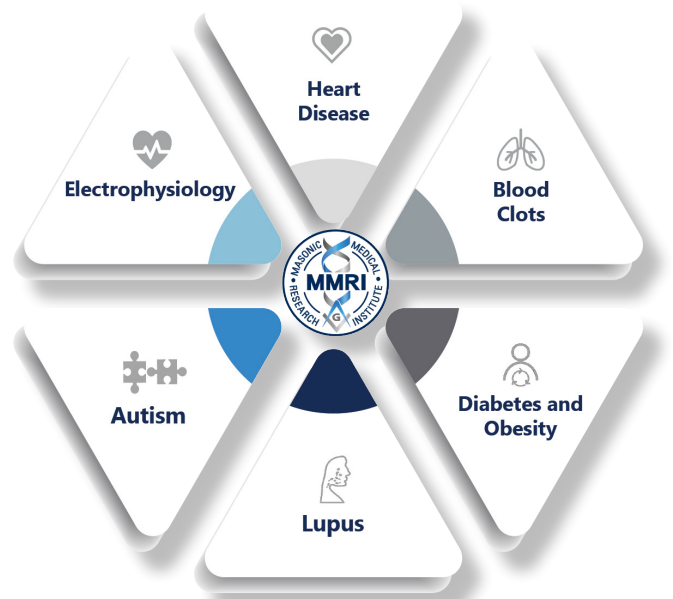


Pictured left to right are Drs. Adife Gulhan Ercan-Sencicek and Maria I. Kontaridis.



Research

The hard work of the scientists and staff at MMRI in 2021 did not go unnoticed, because in January 2022, New York Governor Kathy Hochul mentioned MMRI by name in her State of the State book, citing MMRI as a key example of the benefits of investing in “health and clean tech research infrastructure.” Additionally, our scientists published 25 top-tier, peer-reviewed articles for scientific journals, increasing our overall nationwide footprint for research excellence. Dr. Lin made strides in studying brown fat, the so-called “good fat,” with implications for treating obesity; the impact of COVID on the heart was brought to light by Dr. Tucker; and Dr. Poizat’s team uncovered new mechanisms and rare mutations responsible for heart failure. In June, the American Heart Association awarded MMRI a Diversity Grant Supplement to promote diversity in science, and we were delighted to re-introduce the Summer Fellowship program for the first time since 2019.



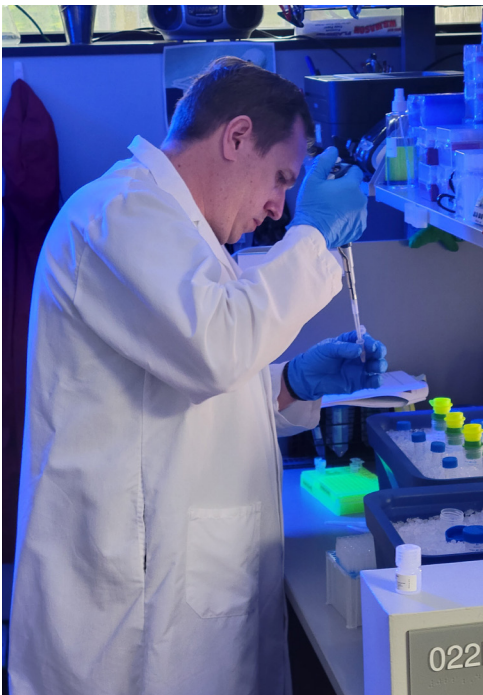
MMRI continues to diversify its research portfolio. Pictured above are just a few areas of research that MMRI specializes in.



Scientific Recognition

Since its founding in 1958, the MMRI has gained international recognition. As the Institute has grown in prominence, members of the scientific staff have received numerous invitations to present their research findings worldwide. MMRI publications have appeared in the most prestigious medical and scientific journals in the world, and as a result, the MMRI has received significant media coverage locally and across the country.

Pictured below is Genetics Core Co-Manager and Research Associate, Ryan Pfeiffer.



Funding

\$4.6 million in multi-year, highly competitive federal and foundational research grants were awarded to MMRI this year. In philanthropy, over \$1.8 million was raised. One notable philanthropic contribution came from the Franklin and Stephen Steinberg Trust, providing another \$1.1M. Other notable contributions include: \$120,000 from the Donald F. Braun Trust; \$50,000 from Paul Huck and Susan Trainer Huck; \$25,734 from Nancy & James Buterbaugh; \$268,750 from the Hazel M Lindenbaum Trust; and \$81,125 from the John & Emma Van Gordon Trust. The 8th Manhattan District Masonic Lodge endowed the Halfond-Weil Postdoctoral Fellowship Fund, to provide an annual \$50,000 award to a postdoctoral fellow. \$25,000 was raised at the Lupus Charity Golf Classic, sponsored by the Lupus and Allied Diseases Association (LADA). We continue to receive support from New York State, and in 2021, we received our first \$3M installment of a \$6M grant awarded from the Empire State Development Corporation (ESD) for building renovations.



Education

Educational programs offered at MMRI include Summer Fellowship, Undergraduate, Predoctoral, and Postdoctoral Fellow Training Programs.



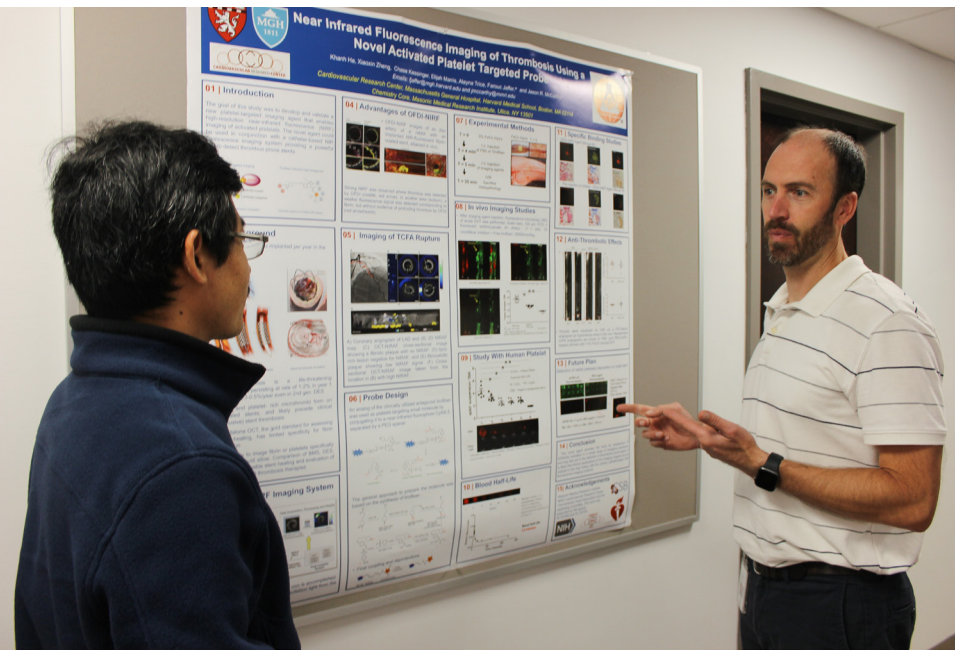
Faculty and Staff

The Institute's faculty, postdoctoral fellows, technicians, students and visiting scholars are all part of a world-class team of scientists working together to improve the quality of life for all. They serve on advisory boards of both State and Federal governmental agencies, as well as editorial boards of scientific journals. The administrative and support staff consist of dedicated individuals who are devoted to furthering the success of the Institute.



Board of Directors

The MMRI is administered by a Board of Directors and the Executive Director. The Board of Directors consists of up to 15 distinguished Masons elected to three-year terms and serve without compensation.



Pictured above is Dr. Jason McCarthy, Scientific Operations Manager and Associate Professor, is presenting a poster to Assistant Professor, Dr. Zhiqiang Lin.

Pictured above is MMRI's Research Assistant, Mayurika Desai.



Masonic Medical Research Institute

Board of Directors 2021

These Brethren, nominated by the Grand Master and elected by vote of Grand Lodge at its Annual Communication, are chosen because of their unique qualifications to administer the affairs of the Masonic Medical Research Institute, based upon their outstanding business and professional experience.

MMRI Board of Directors (Pictured left to right): Sheldon B. Richman, Esq.; Alvaro F. Quiroga-Sanchez, Past President; Peter R. Gray, M.D., Ph.D., FACC; Virgilio S. Quijano; Vincent Cunzio, CPA, Treasurer; David F. Schneeweiss, Chairman of the Board; Robert A. Hewson, DPM, President; David D. Goodwin; James D. Swan, Jr., Secretary; Paul E. Mossberg; Pasquale Imbimbo, Jr., Vice President; Paul A. Guerrero, CMR; Frank R. Williams. (Not pictured above): Michael A. Chaplin, M.D. and Richard J. Miller, Jr., Esq.

MMRI Board of Directors Executive Committee

David F. Schneeweiss, *Chairman of the Board*

Robert A. Hewson, DPM, *President*

Pasquale Imbimbo, Jr., *Vice President*

James D. Swan, Jr., *Secretary*

Vincent Cunzio, CPA, *Treasurer*

Alvaro F. Quiroga-Sanchez, *Past President*

MMRI Board of Directors

Michael A. Chaplin, M.D.

David D. Goodwin

Peter R. Gray, M.D., Ph.D., FACC

Paul A. Guerrero, CMR

Richard J. Miller, Jr., Esq.

Paul E. Mossberg

Virgilio S. Quijano

Sheldon B. Richman, Esq.

Frank R. Williams

MMRI Board of Directors Emeritus

John P. Chang, R.Ph.

Paul N. O'Neill

Laurence I. Sussman

Victor G. Webb

Albert J. Wright, III

Report from the Board of Directors President

To the Grand Lodge:

In 2021, I proudly took over as President of the Board of Directors at the Masonic Medical Research Institute (MMRI); a role with a rich legacy spanning close to 65 years of Masonic and medical research history. The Institute has come a long way since 1958, when it began as a foundation which only raised funds for research, transforming into the state-of-the-art laboratory it is today, conducting research happening right here, right now. MMRI began as a dream of the New York Masons, one in which they could come together and impact the lives of those suffering from rheumatic fever. The dream has since grown to encompass a bigger goal of improving life for all of humankind.

The mission to improve the lives of all is one not only shared by Masons, but by millions of people and organizations across the United States and globally. It is through this shared goal that MMRI was recognized and funded by the Department of Defense, the American Heart Association, the National Institutes of Health, and the Lupus and Allied Diseases Association, all major players in the advancement of medical discoveries. It is also why MMRI has received significant support from the State of New York to renovate its existing laboratory space, updating and expanding the capabilities for life-saving research. In 2021, the final phase of the multi-phase renovation project began, with an expected completion date of May 2022.

With the additional space and heightened progress of numerous projects, MMRI was proud to recruit 11 new team members, 5 of whom joined the science department and 6 who joined administration. Over the course of my 6 years with MMRI, the growth and success of the team here has been nothing short of amazing. I look forward to the coming years. Under the leadership of Dr. Maria Kontaridis and with the finalization of new laboratory space coupled with breakthroughs in scientific discovery, we will continue to see our team flourish and reach new heights.

Additionally, it is my pleasure to extend on behalf of everyone here at the Institute our sincerest gratitude to all those who make the fulfillment of our mission possible. We would not be where we are today without the continuous support of New York State Masons, whose contributions founded and maintained the Institute for 64 years. Likewise, we are always delighted to see interest from Masonic bodies outside New York State's jurisdiction, being humbled by generosity from neighboring states to lodges from across the globe. While MMRI remains a jewel of New York Masonry, we are proud to receive support from non-masonic individuals, organizations, and companies, both local and far, who believe in our shared goals.

Most importantly, I thank the MMRI employees, from science to administration, without whom none of this would be possible. Their dedication, excitement, and contributions make my role as President of the Board of Directors an easy one. Lastly, thank you to the Grand Master MW Richard J. Kessler, the Past Grand Masters, Deputy Grand Master RW Steven Adam Rubin and the entire Grand Line for their continual support of MMRI this year and always. I look forward to 2022 with excitement, knowing that the future will surely exceed expectations. I encourage you all to continue reading on and truly learn about all of the incredible science happening at MMRI! I can almost guarantee that you will be amazed.

Sincerely and Fraternally,



RW Robert A. Hewson, DPM
President, MMRI Board of Directors



Biomedical Research and Translational Medicine 21'

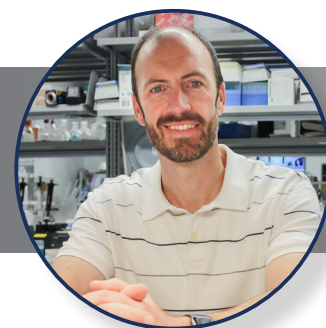


Through the years, the Institute has remained at the forefront of scientific discovery. MMRI scientists continue to seek new knowledge essential for the progress of medical science. The outstanding accomplishments and achievements realized by our team this year is a devotion to the earnest pursuit of scientific discovery through basic experimentation.

Scientific Leadership



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



Jason McCarthy, Ph.D.
Scientific Operations Manager
Associate Professor
Imaging and Nanomedicine

Research Faculty



Gary Aistrup, Ph.D.
Research Assistant Professor
EC Coupling and
Electrophysiology



Ademuyiwa Aromolaran, Ph.D.
Assistant Professor
Metabolism and Cardiac
Channelopathies



Jonathan M. Cordeiro, Ph.D.
Assistant Professor
Electrophysiology and Cardiac
Arrhythmias

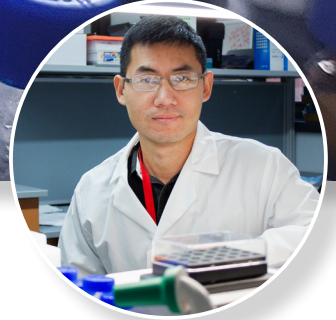
Research Faculty (continued)



Adife Gulhan Ercan-Sencicek, Ph.D.
Instructor
Autism and Molecular Genetics



Chase Kessinger, Ph.D.
Instructor
Pulmonary Embolism and
Venous Thrombosis



Zhiqiang Lin, Ph.D.
Assistant Professor
Diabetes and Obesity



Coralie Poizat, Ph.D.
Research Associate Professor
Cardiomyopathy and Heart Failure



Nathan Tucker, Ph.D.
Assistant Professor
Genomic Decryption



Sathya Dev Unudurthi, Ph.D.
Instructor
Cardiac Inflammation

Scientific Cores



Animal Care

Damian Bohler, LATG
Animal Facilities Manager

Laura Coon
Sr. Animal Care Technician

Chelsea Coyne
Animal Care Technician



Electrophysiology

Robert Goodrow, Jr.
Electrophysiology Core Manager



Fluorescence-activated Cell Sorting (FACS)

Sathya Unudurthi, 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

Mayurika Desai
Research Assistant



Histology/Imaging/Surgery

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

Bing Xu, Ph.D.
Surgeon

Rena Collandra
Research Assistant

Donna Le
Research Assistant

Postdoctoral Fellows



Joyce Bernardi, Ph.D.
Saravanakkumar Chennappan, Ph.D.
Khanh Ha, Ph.D.
Myles Hodgson, Ph.D.
Samantha Le Sommer, Ph.D.
Luana Nunes Santos, Ph.D.
Jagathesh (Bose) Rajendran, Ph.D.
Yan Sun, Ph.D.

Research Associates

Robert Goodrow, Jr.
Michelle Hulke, Ph.D.
Ryan Pfeiffer
Bing Xu, Ph.D.



Research Assistants

Rena Collandra
Mayurika Desai
Jenny Do
Maya Hammonds
Donna Le
Levi Legler
Gregorio Miceli
Steven Negron
Caroline Sheldon
Jacqueline Treat



Scientific Administrative Support

Terri Cronin
*Executive Assistant to the
Executive Director of Research
Board Support*

Jessica Densten
Administrative Assistant



Affiliated Faculty

Ben Boivin, Ph.D.
SUNY Poly-Albany

Zhen Ma, Ph.D.
Syracuse University

Jennifer Peterson, Ph.D.
University of Toledo



Compliance Officer

Kelé Piper



Report from the Executive Director

To the Grand Lodge:

Gratitude and admiration are the words that occupy my thoughts as we close 2021, a year in which we battled and fought a pandemic of epic proportions. Science and technology have made it possible to now live with COVID-19, something we thought near impossible just one year prior. Together with the tireless work and effort of clinicians, scientists, and healthcare professionals from around the world, the faculty and staff at the Masonic Medical Research Institute (MMRI) continued in their unwavering commitment to serve humanity, to have great impact.

From outreach to the local community for COVID testing, to cutting-edge research culminating in greater understanding of long-term COVID effects in the heart, our scientists worked (and continue to work) tirelessly to advance the field of biology and shape the quality of life for all humankind. This is, however, not the first time. What began as a foundation to raise funds to eradicate rheumatic fever, later became the birthplace of a new medical research laboratory, instilled in Utica, New York in 1958. Over the course of the last 63 years, the MMRI has participated in the development and/or implementation of critical devices and therapies utilized around the world, including the pacemaker, defibrillator, catheter ablation therapy and a wide variety of drugs used to treat heart disease. Now, MMRI is a proud, state-of-the-art, stand-alone research facility focused on studying many of the world's most life altering diseases and disorders, including cardiovascular disease, diabetes, autoimmune disorders, autism, and cancer. We are a team of top-tier scientists, conducting basic biomedical research in the heart of central New York.

There is no question that these last couple of years, however, have transformed the way we think about and conduct our research. Our scientists continue to adapt and persevere. They have achieved great success in their research efforts, despite COVID, and garnered over \$4.6M in multi-year, highly competitive federal and foundational research grants this year. To highlight one of our many talented investigators, Dr. Zhiqiang Lin was awarded \$3.2M from the National Institutes of Health (NIH), to be distributed over the next 5 years, in support of his research identifying new ways to prevent heart-muscle death and reduce injury after a heart attack. This award from NIH, whose grants and applicant pool are highly competitive, is both a testament to Dr. Lin and to MMRI's scientific capabilities. In addition, all our faculty, postdoctoral fellows, research associates and assistants worked hard to generate impactful research findings in 2021, culminating in the publication of 25 top-tier, peer-reviewed scientific manuscripts and increasing our overall nationwide footprint for research excellence.

This year, too, we were fortunate to reconnect with a local foundation focused on lupus research and therapeutic discovery, the Lupus and Allied Diseases Association, Inc (LADA). LADA President and CEO, Kathleen Arntsen, and I met several years ago at a lupus research conference in New York City, and it was wonderful to come back together in support of our newly formed Lupus Research Program at the MMRI. In 2021, LADA provided MMRI with \$25,000, to further research efforts on a project funded by the Department of Defense. LADA has historically been instrumental to MMRI's research; they were previously the proud supporters of lupus research in the 1990s, providing \$40,000 in funding. They are now thrilled that lupus research has returned to Utica, NY, with the hope that MMRI's dedication and expertise will benefit people with lupus and allied diseases in the years to come.

This year also brought us great success in philanthropy, raising over \$1.8M. Charitable contributions are essential for the support of MMRI's vital research mission. One notable philanthropic contribution this year came from the Franklin and Stephen Steinberg Trust, providing us another \$1.1M, and making their sum contribution to MMRI over \$6M over the last 3 years. Other significant contributions include: \$268,750 from the Hazel M Lindenbaum Trust; \$120,000 from the Donald F. Braun Trust; \$81,125 from the John & Emma Van Gordon Trust; \$50,000 from Paul Huck and Susan Trainer Huck; \$50,000 from the Ann W. Chadwick Estate, \$45,000 from the John S. Jones Estate, and \$25,734 from Nancy & James Buterbaugh.

In addition to philanthropy, we are grateful for the continued support of our research by New York State and the Regional Economic Development Council. In 2021, we received our first \$3M installment of a \$6M grant awarded to us from the Empire State Development Corporation (ESD), which we used to complete Phase II renovations of our basement and sub-basement laboratory space. But we did not stop there! We are currently at near completion of Phase III renovations, funded by an additional \$668,980 grant award from New York State and Empire State Development. This project, slated for completion in May 2022, will create a new Genetics research wing, completing renovation of every square inch of the current MMRI research space and providing us a platform for additional scientific recruitment in the coming years!

In addition to our science, the MMRI is committed to building an infrastructure of independent thinkers. In this regard, the 8th Manhattan Lodge of New York city endowed the Halfond-Weil Postdoctoral Fellowship Fund, to provide an annual \$50,000 award to a top-talented MMRI postdoctoral fellow. This year we are pleased to have awarded this fellowship to Dr. Khanh Ha, a postdoctoral fellow in the McCarthy Lab, whose project is focused on using nanoparticles to target immune cells for treatment



of atherosclerosis.

MMRI is also committed to fostering and educating the next generation of scientists; one of the most important jobs we have is to inspire and encourage young people to pursue careers in Science, Technology, Engineering, and Math (STEM)-based programs. After the cancellation of 2020's Summer Fellowship Program due to COVID, we were delighted to re-introduce the program in the summer of 2021. With gracious philanthropic support from both individuals and organizations, we were able to bring in 9 talented summer fellows, a graduate student intern, and 2 young scholars for our summer program. To help facilitate the success of the program, Dr. Ha took on the role as our new Coordinator of Predoctoral Research and Postdoctoral Affairs this year, on top of his tremendous scientific achievements. His outreach thus far to students in our community has been highly successful! For the upcoming 2022 summer fellowship program, we already received 49 applications, a first for the MMRI thanks to Dr. Ha's efforts.

The fellowship program has indeed always been a highlight for MMRI and for many aspiring students and their families in our community. Many continue in their scientific trajectories, becoming clinicians, scientists, engineers, or other STEM-based professionals. The funding of this program, therefore, remains a top priority. This year's summer fellowships were sponsored by the Burrows Foundation (\$11,000); Utica Lodge 47 F.& A.M. (\$4,000); The Community Foundation of Herkimer & Oneida County and M&T Bank (\$27,500); White Plains Masonic Historical Society (\$4,000); Cerny Family Trust (\$5,500); and a portion of a generously pledged gift of \$5,500 from Walter R. Leong (\$1,100). In addition, this year, as an honorary tribute to their late son, Alap Butala, who was a former summer fellow, Drs. Atul and Amita Butala made a \$110,000 pledge to support an endowed summer fellowship, a true honor and distinction in memory of a talented young man.

In closing, it is the contributions from fellow Masons, friends, faculty, staff, federal funding agencies, foundations, and corporations that have been hugely impactful to our science, allowing us the opportunity to continue to focus on our core research endeavors. MMRI is, in this regard, a true Masonic jewel; founded upon the principles of the Grand Lodge of Masons of New York State, we are the only Institute of our kind: founded by, supported by, and governed by Masons. We believe in the science, in our team and collaborators, and in the generosity of our supporters. We are unlocking the possibilities for a better, healthier, and more hopeful tomorrow. I am proud to be a part of this organization and of this amazing family.

Sincerely and with gratitude,



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

Administration Leadership



Varun Balaji
*Information Technology
Director*



Susan A. Bartkowiak
*Director of Administration,
Grants Administrator*



Lisa Cooper, CPA
Controller



Curt Fowler
Facilities Manager



Amy Pietrafesa, SPHR
Human Resources Director



Anthony Villanti
*Development, Marketing &
Communications Director*

Administrative Team

Kayliegh Caruso
Marketing and Communications Associate

Ed Colon
Lead Maintenance Mechanic

Hillary Cote
Development Data Analyst

Anthony Cucci
Fraternal Relations & Development Associate

John DeMarco
Senior Maintenance Technician

Jessica Densten
Grants Administrator

Justin Izzo
Procurement and Contracts Coordinator

Stephen Izzo
Principal Development Officer

Crystal Jadwick
Grants, Payroll and Benefits Administrator

Nicole Knoblock
Procurement and Contracts Coordinator

Melissa Kontaridis
Development Officer (Consultant)

Eleanor Kuszmar
Grant Administrator (Consultant)

Tom Lloyd
Facilities Associate

Michael Mayo
Senior Accountant

Owen Moffett
Information Technology Specialist

Victoria Ogrodnik
Accounts Payable Specialist

Kayla Rena
Human Resources Generalist

Adem Rosic
Information Technology Specialist

Shannon Smith
Development Data Analyst

Richard Thomas
Security

Victoria Wenke
Marketing and Communications Assistant

Report from the Controller

To the Grand Lodge:

As year two of the COVID-19 Pandemic raged on throughout 2021, MMRI stayed healthy physically and financially due to excellent investment returns, continued COVID-19 testing revenues, Federal Paycheck Protection Program (PPP) loan forgiveness, and capital support from New York State related to Phase II of Lab renovations. Overall, the Lab had a net surplus of \$3.2M for 2021 as compared to a deficit of \$1.8M in 2020. The main reason for this increase was realization of \$1.5M in investment earnings and \$2.2M in unrealized market value growth. While investment growth can be affected during volatile market conditions, the portfolio is positioned to minimize loss and maximize dividends and gains for long-term growth.

The Institute saw an increase in total grant revenue over 2020 primarily due to the disbursement of \$3M, representing half of a \$6M award from the Empire State Development Corporation (ESD) in support of the Lab renovations referred to as Phase II (basement and sub-basement buildout). The second \$3M disbursement is expected to be requested as soon as the Lab staff count reaches the required number. With active recruiting currently happening, the goal is expected to be reached in 2022.

During 2021 the depth and quantity of research grant applications has greatly increased. There was more than \$4.6M awarded to fund research in future periods and another \$10M of applications submitted in 2021 which are still in review at this time. New grant applications are being submitted at every chance, and, with the approved Federal indirect cost rate of 78% being applied to most applications, receipt of any number of grants not only supports research, but infrastructure necessary to operate the Lab.

Lab expenditures and improvements include commencement of Phase III, the final phase, of building renovations in the Genetics Lab. This was approximately 50% completed at 12/31/21 with \$900k of the \$1.6M project expended. When completed in Spring, 2022, the Institute will be able to request another \$688k from ESD to offset construction costs.

Additionally, overall expenses remained consistent with 2020 showing only a modest 3.8% increase in staffing costs and a net decrease in operating overhead costs (excluding depreciation) of \$20k. Full implementation and two years of history with new accounting, budgeting, and development software has allowed the Institute to create streamlined systems, better reporting, predictive budgeting, and analytical information needed to allow for continued growth without continued cost increases for administrative capabilities.

Even with positive fiscal outcomes, improved systems and technology, and groundbreaking research taking place in renovated facilities, the Institute still needs more resources to ensure sustainability. To that end, management is looking at entrepreneurial opportunities to build its cash flow portfolio. Philanthropy continues to be a major revenue source necessary for future success and, as such, investment in Marketing and Development capacity is a top priority for 2022. There are many exciting opportunities being examined, but until new avenues for sustainable funding are forged, it continues to be the support from grantors and donors that provide the necessary long-term resources to ensure future growth and success.

We look forward to many new opportunities, infrastructure improvements, evolving cutting-edge research, and a growing, talented staff of researchers and administrative professionals to continue our trajectory toward a becoming a world-renowned research Institute!

Sincerely,



Lisa Cooper, CPA
Controller



Financial Statements 21'



MASONIC MEDICAL RESEARCH INSTITUTE FINANCIAL STATEMENTS DECEMBER 31, 2021 and 2020



CERTIFIED PUBLIC ACCOUNTANTS

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p: 716.856.3300 | f: 716.856.2524 | www.LumsdenCPA.com

INDEPENDENT AUDITORS' REPORT

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

Opinion

We have audited the balance sheets of Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute) as of December 31, 2021 and 2020, and the related statements of activities, functional expenses, and cash flows for the years then ended, and the related notes to the 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, 2021 and 2020, 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.

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 accounting principles generally accepted in the United States of America; this includes 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.

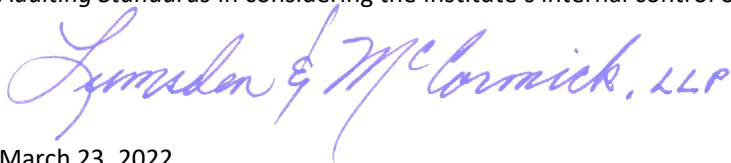
We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control related matters that we identified during the audit.

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 auditing standards generally accepted in the United States of America. 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 23, 2022 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 23, 2022

Balance Sheets

December 31,	2021	2020
Assets		
Current assets:		
Cash	\$ 702,927	\$ 1,401,317
Receivables (Note 2)	3,846,045	3,071,059
Prepaid expenses and other assets	157,992	213,524
	<u>4,706,964</u>	<u>4,685,900</u>
Investments (Note 3)	32,635,484	28,899,883
Charitable gift annuities (Note 4)	367,633	368,399
Property and equipment, net (Note 5)	16,557,355	16,994,343
Cash value of life insurance	1,079,758	1,048,144
	<u>\$ 55,347,194</u>	<u>\$ 51,996,669</u>
Liabilities and Net Assets		
Current liabilities:		
Current portion of long-term debt (Note 6)	\$ -	\$ 11,943,158
Accounts payable	684,648	397,540
Accrued expenses	287,760	480,014
Deferred revenue	12,601	16,066
	<u>985,009</u>	<u>12,836,778</u>
Long-term debt (Note 6)	11,943,158	-
Charitable gift annuities (Note 4)	139,331	149,518
Net assets:		
Without donor restrictions	33,550,158	31,144,256
With donor restrictions (Note 8)	8,729,538	7,866,117
	<u>42,279,696</u>	<u>39,010,373</u>
	<u>\$ 55,347,194</u>	<u>\$ 51,996,669</u>

Statements of Activities

For the years ended December 31,	2021	2020
Net assets without donor restrictions:		
Revenues, gains and support:		
Contributions:		
Masonic Brotherhood Foundation, Inc.	\$ 47,302	\$ 105,587
Legacies and bequests	1,105,058	690,767
Grants	4,748,356	2,029,171
Other	389,404	330,554
Laboratory service fees	1,589,622	2,453,912
Paycheck Protection Program loan forgiveness (Note 7)	703,322	637,290
Investment earnings, net	2,820,831	645,033
Other income	25,893	7,106
Net assets released from restrictions	327,271	318,676
Total revenues, gains, and support	<u>11,757,059</u>	<u>7,218,096</u>
Expenses:		
Program services - research and education	6,656,679	6,586,479
Management and general	2,054,846	1,983,135
Public relations and development	639,632	504,888
Total expenses	<u>9,351,157</u>	<u>9,074,502</u>
Change in net assets without donor restrictions	<u>2,405,902</u>	<u>(1,856,406)</u>
Net assets with donor restrictions:		
Contributions	243,299	74,024
Investment earnings, net	947,393	301,143
Net assets released from restrictions	<u>(327,271)</u>	<u>(318,676)</u>
Change in net assets with donor restrictions	<u>863,421</u>	<u>56,491</u>
Change in net assets	<u>3,269,323</u>	<u>(1,799,915)</u>
Net assets - beginning	<u>39,010,373</u>	<u>40,810,288</u>
Net assets - ending	<u>\$ 42,279,696</u>	<u>\$ 39,010,373</u>

Statements of Functional Expenses

For the years ended December 31,	2021				2020			
	Program Services		Supporting Services		Program Services		Supporting Services	
	Research and Education	Management and General	Public Relations and Development	Total	Research and Education	Management and General	Public Relations and Development	Total
Salaries	\$ 2,501,690	\$ 994,176	\$ 376,792	\$ 3,872,658	\$ 2,398,005	\$ 1,070,715	\$ 253,143	\$ 3,721,863
Payroll taxes and fringe benefits	583,932	241,811	88,843	914,586	600,629	238,352	49,380	888,361
Total salaries and related expenses	3,085,622	1,235,987	465,635	4,787,244	2,998,634	1,309,067	302,523	4,610,224
Research expenses	1,405,024	-	-	1,405,024	1,526,099	-	-	1,526,099
Buildings and grounds operations	199,236	71,052	7,127	277,415	166,323	42,580	6,570	215,473
Equipment and repairs	101,918	24,701	2,089	128,708	183,792	47,534	2,842	234,168
Office expenses	58,949	109,210	29,292	197,451	53,554	95,135	31,156	179,845
Conferences, travel and meals	30,213	44,228	5,148	79,589	26,478	34,583	22,569	83,630
Professional fees and outside services	12,788	289,533	11,325	313,646	88,223	234,331	50,442	372,996
Publicity, promotion and sponsorships	5,113	-	86,915	92,028	7,534	16,366	63,493	87,393
Insurance	54,381	36,083	1,966	92,430	41,753	28,543	1,792	72,088
Depreciation	1,502,163	137,464	18,542	1,658,169	1,288,157	106,145	14,990	1,409,292
Interest	199,925	52,471	6,631	259,027	205,566	53,948	6,818	266,332
Loss on disposal of property and equipment	-	37,724	-	37,724	-	-	-	-
Miscellaneous	1,347	16,393	4,962	22,702	366	14,903	1,693	16,962
	\$ 6,656,679	\$ 2,054,846	\$ 639,632	\$ 9,351,157	\$ 6,586,479	\$ 1,983,135	\$ 504,888	\$ 9,074,502

Statements of Cash Flows

For the years ended December 31,	2021	2020
Operating activities:		
Change in net assets	\$ 3,269,323	\$ (1,799,915)
Adjustments to reconcile change in net assets to net cash flows from operating activities:		
Paycheck Protection Program loan forgiveness	(703,322)	(637,290)
Depreciation	1,658,169	1,409,292
Loss on disposal of property and equipment	37,724	-
Net realized and unrealized gains on investments	(2,864,120)	(224,651)
Increase in cash value of life insurance	(31,614)	(36,862)
Charitable gift annuities	(9,421)	(20,210)
Changes in other operating assets and liabilities:		
Receivables	(774,986)	848,851
Prepaid expenses and other assets	55,532	(102,865)
Accounts payable	287,108	101,703
Accrued expenses	(192,254)	249,208
Deferred revenue	(3,465)	16,066
Net operating activities	728,674	(196,673)
Investing activities:		
Property and equipment purchases	(1,258,905)	(4,071,932)
Proceeds from sales of investments	8,211,872	10,367,149
Purchases of investments	(9,083,353)	(6,265,195)
Net investing activities	(2,130,386)	30,022
Financing activities:		
Proceeds from Paycheck Protection Program loan	703,322	637,290
Payments on long-term debt	-	(999,121)
Proceeds from issuance of long-term debt	-	1,702,293
Net financing activities	703,322	1,340,462
Net change in cash	(698,390)	1,173,811
Cash - beginning	1,401,317	227,506
Cash - ending	\$ 702,927	\$ 1,401,317

Notes to Financial Statements

1. Summary of Significant Accounting Policies:

Organization:

Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute), located in Utica, New York, is 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. Between June 2020 and June 2021, the Institute performed COVID-19 testing and generated laboratory service fee revenue to support the needs of the local healthcare system and to obtain positive COVID-19 samples used for research to determine the long-term effects of the virus on the heart and other organs.

Subsequent Events:

The Institute has evaluated events and transactions for potential recognition or disclosure through March 23, 2022, 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.

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 unconditioned 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, pharmaceutical companies, and other nonprofit organizations. These conditional contributions are recognized as revenue when allowable expenditures are incurred. 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. In 2021, the Institute recognized \$3,000,000 of grant revenue from Empire State Development and amounts totaling \$3,000,000 are included in receivables on the accompanying 2021 balance sheet.

Laboratory Service Fees and Related Receivables:

Laboratory service fees were recognized for COVID-19 tests performed based on contract prices and terms established with a local healthcare system. Payment from the healthcare system was generally due within 90 days of billing.

Laboratory service fees receivable were stated at the amount management expected to collect from outstanding balances (see Note 2). No allowance for doubtful collections was deemed necessary at December 31, 2020. No receivables were outstanding at December 31, 2021.

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.

Use of Estimates:

The preparation of financial statements in conformity 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:

	2021	2020
Contributions:		
Grants	\$ 3,320,334	\$ 505,774
Others	483,945	921,545
Laboratory service fees	-	1,622,772
Accrued interest	21,759	20,844
Other receivables	20,007	124
	<u>\$ 3,846,045</u>	<u>\$ 3,071,059</u>

3. Investments:

	2021	2020
Cash and cash equivalents	\$ 1,891,519	\$ 2,009,668
Mutual funds	4,757,621	3,846,603
Equity securities	24,870,268	21,983,683
U.S. government securities	1,116,076	1,059,929
	<u>\$ 32,635,484</u>	<u>\$ 28,899,883</u>

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

	2021	
	Without Donor Restrictions	With Donor Restrictions
Dividends and interest	\$ 676,990	\$ 227,114
Net realized gains	437,045	136,763
Net unrealized gains	1,706,796	583,516
	<u>\$ 2,820,831</u>	<u>\$ 947,393</u>
	2020	
	Without Donor Restrictions	With Donor Restrictions
Dividends and interest	\$ 545,773	\$ 175,752
Net realized losses	(36,651)	(48,765)
Net unrealized gains	135,911	174,156
	<u>\$ 645,033</u>	<u>\$ 301,143</u>

4. Charitable Gift Annuities:

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), income distributions cease. State mandated reserves related to charitable gift annuity agreements are maintained at the required level.

The assets and liabilities of the planned giving program as of December 31, 2021 are \$367,633 and \$139,331. The assets and liabilities of the planned giving program as of December 31, 2020 were \$368,399 and \$149,518.

5. Property and Equipment:

	2021	2020
Buildings and improvements	\$ 16,197,169	\$ 16,623,778
Equipment	8,022,039	9,968,070
Furniture and fixtures	189,832	437,257
Vehicles	75,076	75,076
Construction in progress	938,191	78,500
	<u>25,422,307</u>	<u>27,182,681</u>
Less accumulated depreciation	8,864,952	10,188,338
	<u>\$ 16,557,355</u>	<u>\$ 16,994,343</u>

Interest totaling and \$41,488 was capitalized during the year ended December 31, 2020. Construction in progress at December 31, 2021 relates to costs for a renovation project expected to be completed in 2022 with an estimated cost of \$1,570,000 to be partially funded with governmental grants.

6. Long-Term Debt:

The Institute has available a \$12,000,000 bank revolving line note to finance renovations of its building completed in 2020. The note carries interest at 1% below prime (2% above the one-month LIBOR rate in 2020) and is secured by specific Institute investments valued at \$16,833,000 at December 31, 2021 (\$18,003,000 at December 31, 2020). The original note was due in October 2021 and was renegotiated to monthly interest-only payments through October 2023, at which time the principal balance is due. Amounts outstanding at December 31, 2021 and 2020 totaled and \$11,943,158.

7. Paycheck Protection Program Loans:

In April 2020, the Institute received a loan totaling \$637,290 from the Small Business Administration (SBA) under the Paycheck Protection Program (PPP) of the Coronavirus Aid, Relief and Economic Security (CARES) Act, in response to the pandemic described in Note 14. The Institute met the requirements of forgiveness as of December 2020 and recognized income in 2020. During 2021, the Institute received a second PPP loan totaling \$703,322. The loan was forgiven by the SBA in September 2021 and is recognized as income in 2021.

8. Net Assets with Donor Restrictions:

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

	2021	2020
Subject to expenditure for research	\$ 3,237,723	\$ 3,011,611
Subject to the passage of time	460,369	390,456
Subject to the Institute's spending policy and appropriation:		
Investment in perpetuity (including amounts above the original gift value of \$3,007,271), which, once appropriated, is expendable to support research (see Note 9)	5,031,446	4,464,050
Total net assets with donor restrictions	\$ 8,729,538	\$ 7,866,117

9. 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 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, 2021 and 2020 is as follows:

	<u>2021</u>	<u>2020</u>
Endowment assets – beginning balance	\$ 4,464,050	\$ 4,475,656
Investment gains, net of custodian fees	567,396	172,620
Appropriations	-	(184,226)
Endowment assets – ending balance	<u>\$ 5,031,446</u>	<u>\$ 4,464,050</u>

10. 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 amounted to \$235,793 and \$233,946 in 2021 and 2020.

11. 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, 2021 and 2020, the Institute received contributions of \$28,980 and \$88,042 for operations through Masonic Brotherhood Foundation, Inc.

In addition, at December 31, 2021 and 2020, Masonic Brotherhood Foundation, Inc. held in a custodial account \$811,186 and \$660,677 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 2021 and 2020 were \$18,322 and \$17,545.

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, 2022. Annual expenses totaling \$30,900 and \$35,869 were incurred for the years ended December 31, 2021 and 2020. A total of \$29,720 was due to the Grand Lodge at December 31, 2020 for fundraising services and other expenses which is included in accrued expenses on the accompanying 2020 balance sheet. No amounts were outstanding at December 31, 2021.

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 \$187,996 and \$154,678 for 2021 and 2020 and amounts totaling \$13,283 and \$26,486 are included in accounts payable on the accompanying balance sheets at December 31, 2021 and 2020. Additionally, the Institute leased a separate building from MCC through November 2021 and recognized expense totaling \$21,000 and \$3,000 in 2021 and 2020.

12. Cash Flows Information:

Net cash flows from operating activities reflect cash payments for noncapitalized interest totaling \$258,108 and \$276,620 for the years ended December 31, 2021 and 2020.

13. 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, 2021 and 2020:

	<u>2021</u>	<u>2020</u>
Cash	\$ 702,927	\$ 1,401,317
Receivables	3,846,045	3,071,059
Investments	32,635,484	28,899,883
Less: investments restricted to expenditure for research	(3,237,723)	(3,011,611)
Less: investments subject to the Institute's spending policy and appropriation	(5,031,446)	(4,464,050)
Less: investments held as collateral for bank debt	(16,832,826)	(18,003,328)
	<u>\$ 12,082,461</u>	<u>\$ 7,893,270</u>

14. 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.

On January 31, 2020, the United States Secretary of Health and Human Services (HHS) declared a public health emergency related to the global spread of coronavirus COVID-19, and a pandemic was declared by the World Health Organization in February 2020. Efforts to fight the widespread disease included limiting or closing many businesses and resulted in a severe disruption of operations for organizations. Financial markets also experienced a significant decline in value. The extent of the impact of COVID-19 on the Institute's operational and financial resources will depend on further developments, including the duration and spread of the outbreak. While the research lab was classified as an "essential business" by the New York State Governor and could remain open during the crisis, the overall impact on suppliers, donors, grantors, and employees cannot be predicted at this time.

Supplementary Information
Schedule of Expenditures of Federal Awards

For the year ended December 31, 2021

<u>Federal Grantor/Pass-Through Grantor/Program Title</u>	<u>Assistance Listing Number</u>	<u>Grantor Number</u>	<u>Expenditures</u>
Research and Development Cluster:			
U.S. Department of Defense:			
Direct award:			
Military Medical Research and Development	12.420	LR200032	\$ 24,590 ¹
Passed through Vanderbilt University Medical Center:			
Military Medical Research and Development	12.420	1810536	25,801
U.S. Department of Veteran Affairs:			
Direct award:			
Intergovernmental Personnel Act	64.XXX	n/a	9,812
U.S. Department of Health and Human Services:			
Passed through The Brigham and Women's Hospital, Inc.:			
Cancer Biology Research	93.396	190838	20,744
Direct awards:			
Cardiovascular Diseases Research	93.837	102368	661,859 ²
Cardiovascular Diseases Research	93.837	140187	196,388
Cardiovascular Diseases Research	93.837	147044	260,930
			1,119,177
Passed through The Brigham and Women's Hospital, Inc.:			
Cardiovascular Diseases Research	93.837	148207	60,561
Cardiovascular Diseases Research	93.837	115141	24,039
Cardiovascular Diseases Research	93.837	148355	52,105
			136,705
Passed through Norfolk State University:			
Cardiovascular Diseases Research	93.837	145530	26,862
Passed through Regents of the University of Michigan:			
Blood Diseases and Resources Research	93.839	144550	73,157
Passed through Vanderbilt University Medical Center:			
Biomedical Research and Research Training	93.859	126062	32,241
Total Expenditures of Federal Awards			\$ 1,469,089

¹ Includes subrecipient award of \$3,357

² Includes subrecipient award of \$144,357

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 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 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 financial statements of Masonic Medical Research Laboratory, dba Masonic Medical Research Institute (the Institute), which comprise the balance sheet as of December 31, 2021, and the related 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 23, 2022.

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.

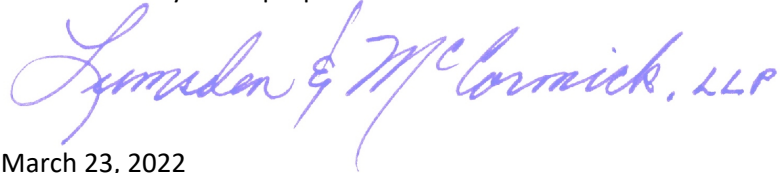
Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not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

A handwritten signature in blue ink that reads "Lynden & McCormick, LLP". The signature is written in a cursive, flowing style.

March 23, 2022

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, 2021. 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, 2021.

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 (*Government Auditing Standards*); 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.

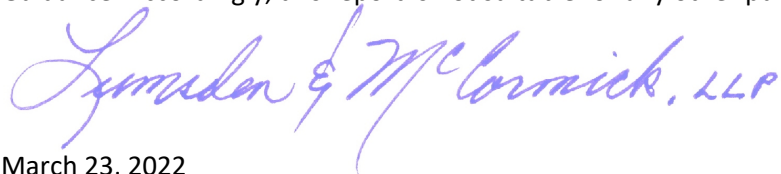
Report on Internal Control Over Compliance

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.

A handwritten signature in blue ink that reads "Lynden & McCormick, LLP". The signature is written in a cursive, flowing style.

March 23, 2022

Schedule of Findings and Questioned Costs

For the year ended December 31, 2021

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:

<u>Name of Federal Program or Cluster</u>	<u>Amount</u>
Research and Development Cluster	\$ 1,469,089

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.



Masonic Medical Research Institute

2021 YEAR IN REVIEW



2021 MMRI Publications

Publications are an essential component of medical research, providing the means by which the scientific community communicates their work. Through their documentation of experimental results, researchers can learn from one another and aid in collaborative efforts that can further advance therapeutics and/or scientific discovery. Teachers can also utilize the published manuscripts to educate the next generation of aspiring scientists. Additionally, publishing in peer-reviewed journals allows for local, national, and global recognition of an individual, team, university, or institution. In 2021 our researchers collectively published 25 manuscripts in top-tier scientific journals, covering topics such as arrhythmias, atrial fibrillation, metabolism, nanotherapies, brown adipose tissue, heart failure, and COVID-19.

A patient with mental retardation, enteropathy, deafness, peripheral neuropathy, ichthyosis, keratoderma syndrome caused by AP1B1 gene variant. Meriç R, **Ercan-Sencicek AG**, Uludağ Alkaya D, Şahin Y, Sar M, Bilguvar K, Tüysüz B. *Clin Dysmorphol*. 2021 Jan 30; PMID: 32969855.

Circadian Mechanisms: Cardiac Ion Channel Remodeling and Arrhythmias. **Bernardi J, Aromolaran KA**, Zhu H, **Aromolaran AS**. *Front Physiol*. 2021 Jan 14; PMID: 33519516.

NOS1AP polymorphisms reduce NOS1 activity and interact with prolonged repolarization in arrhythmogenesis. Ronchi C, **Bernardi J**, Mura M, Stefanello M, Badone B, Rocchetti M, Crotti L, Brink P, Schwartz PJ, Gneccchi M, Zaza A. *Cardiovasc Res*. 2021 Jan 21; PMID: 32061134.

Labeling and tracking cells with gold nanoparticles. Chandrasekaran R, Madheswaran T, Tharmalingam N, **Bose RJ**, Park H, Ha DH. *Drug Discov Today*. 2021 Jan 26; PMID: 33130336.

Isolating Brown Adipocytes from Murine Interscapular Brown Adipose Tissue for Gene and Protein Expression Analysis. **Negron SG, Xu B, Lin Z**. *J Vis Exp*. 2021 Mar 12; PMID: 33779621.

Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography Imaging Predicts Vein Wall Scarring and Statin Benefit in Murine Venous Thrombosis. **Kessinger CW**, Qi G, Hassan MZO, Henke PK, Tawakol A, Jaffer FA. *Circ Cardiovasc Imaging*. 2021 Mar 14; PMID: 33724049.

Time-Restricted Salutary Effects of Blood Flow Restoration on Venous Thrombosis and Vein Wall Injury in Mouse and Human Subjects. Li W, **Kessinger CW**, Oriei M, Lee H, Wang L, Weinberg I, Jaff MR, Reed GL, Libby P, Tawakol A, Henke PK, Jaffer FA. *Circulation*. 2021 Mar 23;143(12):1224-1238. doi: 10.1161/CIRCULATIONAHA.120.049096. Epub 2021 Jan 15. PMID: 33445952; PMCID: PMC7988304.

Single-cell meta-analysis of SARS-CoV-2 entry genes across tissues and demographics. Muus C, Luecken MD, Eraslan G, Sikkema L, Waghray A, Heimberg G, Kobayashi Y, Vaishnav ED, Subramanian A, Smillie C, Jagadeesh KA, Duong ET, Fiskin E, Triglia ET, Ansari M, Cai P, Lin B, Buchanan J, Chen S, Shu J, Haber AL, Chung H, Montoro DT, Adams T, Aliee H, Allon SJ, Andrusivova Z, Angelidis I, Ashenberg O, Bassler K, Bécavin C, Benhar I, Bergenstråhle J, Bergenstråhle L, Bolt L, Braun E, Bui LT, Callori S, Chaffin M, Chichelnitskiy E, Chiou J, Conlon TM, Cuoco MS, Cuomo ASE, Deprez M, Duclos G, Fine D, Fischer DS, Ghazanfar S, Gillich A, Giotti B, Gould J, Guo M, Gutierrez AJ, Habermann AC, Harvey T, He P, Hou X, Hu L, Hu Y, Jaiswal A, Ji L, Jiang P, Kapellos TS, Kuo CS, Larsson L, Leney-Greene MA, Lim K, Litviňuková M, Ludwig LS, Lukassen S, Luo W, Maatz H, Madisson E, Mamanova L, Manakongtreecheep K, Leroy S, Mayr CH, Mbanjo IM, McAdams AM, Nabhan AN, Nyquist SK, Penland L, Poirion OB, Poli S, Qi C, Queen R, Reichart D, Rosas I, Schupp JC, Shea CV, Shi X, Sinha R, Sit RV, Slowikowski K, Slyper M, Smith NP, Sountoulidis A, Strunz M, Sullivan TB, Sun D, Talavera-López C, Tan P, Tantivit J, Travaglini KJ, **Tucker NR**, Vernon KA, Wadsworth MH, Waldman J, Wang X, Xu K, Yan W, Zhao W, Ziegler CGK; *Nat Med*. 2021 Mar 27; PMID: 33654293.

Role of t-tubule remodeling on mechanisms of abnormal calcium release during heart failure development in canine ventricle. Yamakawa S, Wu D, Dasgupta M, Pedamallu H, Gupta B, Modi R, Mufti M, O'Callaghan C, Frisk M, Louch WE, Arora R, Shiferaw Y, Burrell A, Ryan J, Nelson L, Chow M, Shah SJ, **Aistrup G**, Zhou J, Marszalec W, Wasserstrom JA. *Am J Physiol Heart Circ Physiol*. 2021 Apr 1; PMID: 33635163.

COVID-19 and Cardiovascular Disease: From Bench to Bedside. Chung MK, Zidar DA, Bristow MR, Cameron SJ, Chan T, Harding CV 3rd, Kwon DH, Singh T, Tilton JC, Tsai EJ, **Tucker NR**, Barnard J, Loscalzo J. *Circ Res*. 2021 Apr 16; PMID: 33856918.

Biomimetic bacterial and viral-based nanovesicles for drug delivery, theranostics, and vaccine applications. Loo YS, **Bose RJ, McCarthy JR**, Mat Azmi ID, Madheswaran T. *Drug Discov Today*. 2021 Apr 26; PMID: 33383213.

Engineering spatial-organized cardiac organoids for developmental toxicity testing. Hoang P, Kowalczewski A, Sun S, Winston TS, Archilla AM, Lemus SM, **Ercan-Sencicek AG**, Gupta AR, Liu W, **Kontaridis MI**, Amack JD, Ma Z. *Stem Cell Reports*. 2021 May 11; PMID: 33891865.

Bio-inspired nanomaterials as novel options for the treatment of cardiovascular disease. **Bose RJ, Ha K, McCarthy JR**. *Drug Discov Today*. 2021 May 26; PMID: 33561512.

An in silico hiPSC-Derived Cardiomyocyte Model Built With Genetic Algorithm. Akwaboah AD, Tsevi B, Yamlome P, **Treat JA**, Brucal-Hallare M, **Cordeiro JM**, Deo M. *Front Physiol.* 2021 Jun 16; PMID: 34220540.

YAP/TEAD1 Complex Is a Default Repressor of Cardiac Toll-Like Receptor Genes. Gao Y, Sun Y, Ercan-Sencicek AG, King JS, Akerberg BN, Ma Q, **Kontaridis MI**, Pu WT, **Lin Z**. *Int J Mol Sci.* 2021 Jun 22; PMID: 34206257.

In Vivo Platelet Detection Using a Glycoprotein IIb/IIIa-Targeted Near-Infrared Fluorescence Imaging Probe. Ha K, Zheng X, **Kessinger CW**, Mauskapf A, Li W, Kawamura Y, Orii M, Hilderbrand SA, Jaffer FA, **McCarthy JR**. *ACS Sens.* 2021 Jun 25; PMID: 34056903.

Overlap Arrhythmia Syndromes Resulting from Multiple Genetic Variations Studied in Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes. **Treat JA**, **Pfeiffer R**, Barajas-Martinez H, **Goodrow RJ**, Bot C, Haedo RJ, Knox R, **Cordeiro JM**. *Int J Mol Sci.* 2021 Jul 1; PMID: 34281161.

Mutation in FBXO32 causes dilated cardiomyopathy through up-regulation of ER-stress mediated apoptosis. Al-Yacoub N, Colak D, Mahmoud SA, **Hammonds M**, Muhammed K, Al-Harazi O, Assiri AM, Al-Buraiki J, Al-Habeeb W, **Poizat C**. *Commun Biol.* 2021 Jul 16; PMID: 34272480.

Ca²⁺/calmodulin kinase II-dependent regulation of β IV-spectrin modulates cardiac fibroblast gene expression, proliferation, and contractility. Nassal DM, Patel NJ, **Unudurthi SD**, Shaheen R, Yu J, Mohler PJ, Hund TJ. *J Biol Chem.* 2021 Jul 29; PMID: 34153319.

SnRNA sequencing defines signaling by RBC-derived extracellular vesicles in the murine heart. Valkov N, Das A, **Tucker NR**, Li G, Salvador AM, Chaffin MD, Pereira De Oliveira Junior G, Kur I, Gokulnath P, Ziegler O, Yeri A, Lu S, Khamesra A, Xiao C, Rodosthenous R, Srinivasan S, Toxavidis V, Tigges J, Laurent LC, Momma S, Kitchen R, Ellinor P, Ghiran I, Das S. *Life Sci Alliance.* 2021 Oct 18; PMID: 34663679.

Deep learning enables genetic analysis of the human thoracic aorta. Pirruccello JP, Chaffin MD, Chou EL, Fleming SJ, Lin H, Nekoui M, Khurshid S, Friedman SF, Bick AG, Arduini A, Weng LC, Choi SH, Akkad AD, Batra P, **Tucker NR**, Hall AW, Roselli C, Benjamin EJ, Vellarikkal SK, Gupta RM, Stegmann CM, Juric D, Stone JR, Vasan RS, Ho JE, Hoffmann U, Lubitz SA, Philippakis AA, Lindsay ME, Ellinor PT. *Nat Genet.* 2021 Nov 26; PMID: 34837083.

Engineered Cell-Derived Vesicles Displaying Targeting Peptide and Functionalized with Nanocarriers for Therapeutic microRNA Delivery to Triple-Negative Breast Cancer in Mice. **Bose RJ**, Kumar US, Garcia-Marques F, Zeng Y, Habte F, **McCarthy JR**, Pitteri S, Massoud TF, Paulmurugan R. *Adv Healthc Mater.* 2021 Dec 8; PMID: 34879180.

Molecular Pathophysiology of Cardiac Injury and Cardiac Microthrombi in Fatal COVID-19: Insights from Clinico-histopathologic and Single Nuclei RNA Sequencing Analyses. Fukuma N, Hulke ML, Brener MI, Golob S, Zilinyi R, Zhou Z, Tzimas C, Russo I, McGroder C, Pfeiffer R, Chong A, Zhang G, Burkhoff D, Leon MB, Maurer M, Moses JW, Uhlemann AC, Hibshoosh H, Uriel N, Szabolcs MJ, Redfors B, Marboe CC, Baldwin MR, **Tucker NR**, Tsai EJ. *bioRxiv [Preprint]*. 2021 Jul 27; Update in: *JCI Insight.* 2021 Dec 14; PMID: 34341789.

Clinico-histopathologic and single nuclei RNA sequencing insights into cardiac injury and microthrombi in critical COVID-19. Brener MI, **Hulke ML**, Fukuma N, Golob S, Zilinyi RS, Zhou Z, Tzimas C, Russo I, McGroder C, **Pfeiffer RD**, Chong A, Zhang G, Burkhoff D, Leon MB, Maurer MS, Moses JW, Uhlemann AC, Hibshoosh H, Uriel N, Szabolcs MJ, Redfors B, Marboe CC, Baldwin MR, **Tucker NR**, Tsai EJ. *JCI Insight.* 2021 Dec 14; PMID: 34905515.

Phosphatidylinositol-4,5-Bisphosphate Binding to Amphiphysin-II Modulates T-Tubule Remodeling: Implications for Heart Failure. Zhou J, Singh N, Monnier C, Marszalec W, Gao L, Jin J, Frisk M, Louch WE, Verma S, Krishnamurthy P, Nico E, Mulla M, **Aistrup GL**, Kishore R, Wasserstrom JA. *Front Physiol.* 2021 Dec 23; PMID: 35002765.

Federal and Foundation Grant Funding

Grant funding is an important and integral component of medical research, as it provides our investigators with the vital financial resources to conduct cutting-edge science. Faculty at the MMRI submit numerous grant proposals to federal agencies and national foundations each year. These are all highly competitive applications that are peer reviewed by the nation's top scientific experts. As such, receipt of these awards validates the importance and significance of the science at MMRI. Grants are commonly multi-year awards, with annual budgeting allocations distributed to secure the continuation of the project for the duration of the funding period.



Masonic Medical Research Institute 2021 all staff image.

2021 Federal and Foundation Grant Funding

Kontaridis, Ph.D., Maria I.

National Institutes of Health R01 Research Grant

(Kontaridis, PI)

Role of RhoA in the Molecular Pathogenesis of Heart Disease

In this renewal, we will 1) examine RhoA-mediated paracrine signals that drive myofibroblast transformation and activation; 2) determine if RhoA signaling is necessary and sufficient for direct myofibroblast function both in vitro and in vivo using a novel inducible, fibroblast-specific transgenic approach; 3) utilize novel nanoparticle targeting technology to deliver cell specific inhibitors of RhoA effectors to ameliorate fibrosis and to prevent cardiac disease progression.

No overlap.

04/15/10 - 12/31/22

\$402,378/year

National Institutes of Health R01 Research Grant

(Schatton, PI; Kontaridis, Co-Inv)

Role of melanoma-PD-1 in cancer progression

The major goal is to determine the functional effects of PD-1 in cancer as a consequence of SHP2 activity and downstream signaling.

No overlap.

09/13/17 - 07/31/22

\$20,366/year

Onconova Therapeutics

(Kontaridis, PI)

Treatment of cardiac hypertrophy using RAF1 inhibitors

The major goal of this project is to characterize the role of RAF1 signaling in cardiomyocyte hypertrophy with an aim of identifying potential therapeutic targets.

No overlap.

04/17/20 - 04/16/22

\$176,827/year

American Heart Association Transformational Grant Award

(Kontaridis, PI; Ercan-Sencicek, Co-Inv.)

PTPN11 mutations: a causal mechanism linking congenital heart disease to autism spectrum disorders

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.

1/1/21 - 12/31/23

\$99,995.50/year

American Heart Association Diversity Supplement Award

(Nunes Santos, PI)

Research Supplement to Promote Diversity in Science.

07/01/21 - 06/30/23

\$66,554/year

Lupus and Allied Diseases Association, Inc.

(Kontaridis, PI)

Resolution of the pathogenesis of lupus using molecular signaling targeting.

The project will determine the signaling pathways that can be targeted to resolve lupus pathogenicity.

8/19/21 - 12/31/21

\$25,000

Department of Defense Lupus Impact Award

(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.

9/30/21 - 9/29/25

\$187,500/year

Aromolaran, Ph.D., Ademuyiwa

National Institutes of Health R01 Research Grant

(Aromolaran, PI)

Mechanisms of Lipotoxic Cardiomyopathy

The major goals of this grant proposal are to define the role of free-fatty acids in the pathogenesis of atrial fibrillation underlain by lipotoxicity.

No overlap.

2019 - 07/31/21

\$437,500/year

2021 Federal and Foundation Grant Funding (continued)

Cordeiro, Ph.D., Jonathan

National Institutes of Health Academic Research Enhancement Award

08/01/19 - 11/21

(Deo, PI; Cordeiro, Co-Inv.)

\$35,000/year

Role of Cardiac Purkinje System in Long QT Syndrome

The long QT syndrome (LQTS) is a heritable or acquired cardiac disease characterized by prolongation of the QT interval on the ECG and increases the risk of developing spontaneous polymorphic ventricular tachycardia (VT) and sudden cardiac death in young patients. Our general hypothesis is that prolongation of inherently longer action potentials in the His-PS in response to loss of repolarizing current I_{Kr} together with modulation of electrical excitations within the PS network makes the ventricular conduction system a preferable arrhythmia-prone substrate in LQTS. A systematic study will be conducted to investigate the mechanisms by which PS contributes to arrhythmias (specifically LQT2) using experimental characterizations in transfected cardiomyocytes (CMs), combined with previously acquired ion channel data and multiscale computer modeling/ predictive simulations. Dr. Cordeiro's role is to perform the cardiomyocyte experiments which will then be incorporated into a multiscale computer model.

Lin, Ph.D., Zhiqiang

National Institutes of Health R01 Research Grant

12/15/21 – 11/30/26

(Lin, PI; McCarthy, Co-Inv.)

\$640,967/year

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.

McCarthy, Ph.D., Jason

National Institutes of Health R01 Research Grant

04/01/15 - 03/31/21

(McCarthy, PI)

\$355,329/year

Targeted inhibition of fibrosis for the prevention of heart failure

This proposal focuses on the synthesis, characterization, and applications of targeted nanoagents for the prevention of fibrosis after myocardial infarction via the inhibition of pro-fibrotic pathways downstream of the Rho kinase RhoA.

National Institutes of Health R01 Research Grant

01/01/18 – 12/31/21

(Kontaridis, PI; McCarthy, Co-Inv.)

\$128,445/year

Role of RhoA in the Molecular Pathogenesis of Heart Disease

This project is designed to investigate the cellular interactions responsible for the promotion of fibrosis in the injured heart.

Department of Defense Military Medical Research and Development Grant

07/01/18 – 09/29/21

(Schoenecker, PI; McCarthy, Co-Inv.)

\$17,101/year

Plasmin Therapy to Prevent Post-Traumatic Heterotopic Ossification in the Upper Extremity After Severe Injury

One of the greatest mysteries, and problems, is why these severely injured patients often develop bone in areas of muscle injuries. This is called heterotopic ossification and is a big problem in the military as it has inflicted more the 60% of severe injuries during the Afghanistan and Iraqi conflicts. It is well known that plasmin, a protein capable of breaking up other proteins, is very important in muscle and bone healing. We have recently discovered that it also is important in preventing heterotopic ossification, and that in cases of severe injury, it is used up. We therefore tested the idea that we could prevent heterotopic ossification from forming if we used drugs to restore this protein.

Department of Veterans Affairs (IPA) Intergovernmental Personnel Act

04/01/19 – 09/30/23

(Menick, PI; McCarthy, Co-Inv.)

\$10,312.50/year

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.

2021 Federal and Foundation Grant Funding (continued)

National Institutes of Health R01 Research Grant

(Henke, PI; McCarthy, Co-Inv.)

02/01/20 - 01/31/24

\$62,269/year

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

(Feinberg, PI; McCarthy, Co-Inv.)

04/01/20 - 04/30/22

\$43,435/year

LncRNA SNHG12, vascular senescence, and atherosclerosis

LncRNA SNHG12 plays a critical role in key aspects of the vascular endothelial inflammation or senescence in the context of atherosclerosis. To help explore the pathobiology and mechanisms of this lncRNA in the setting of disease, we will generate nanomaterials targeted to these lesions for the site-specific delivery of a gapmer to SNHG12.

National Institutes of Health R01 Research Grant

(Feinberg, PI; McCarthy, Co-Inv.)

04/01/20 - 04/30/22

\$43,435/year

miR-615, AKT/eNOS signaling, and angiogenesis

MicroRNA miR-615 has been described to control angiogenesis in a range of ischemic cardiovascular disease models such as myocardial and limb ischemia. To help explore the pathobiology and mechanisms underlying key aspects of the angiogenesis in the context of myocardial and limb ischemia, we will generate nanomaterials targeted to these tissues for the site-specific delivery of an anti-miR to miR-615-5p.

National Institutes of Health R01 Research Grant

(Schoenecker, PI; McCarthy, Co-Inv.)

01/01/21 - 12/31/23

\$32,746/year

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.

National Institutes of Health R01 Research Grant

(Feinberg, PI; McCarthy, Co-Inv.)

08/15/21 - 07/31/23

\$74,137/year

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.

Tucker, Ph.D., Nathan

National Institutes of Health K01 Research Grant

(Tucker, PI)

04/01/18 - 05/31/23

\$167,400/year

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.

2021 Federal and Foundation Grant Funding (continued)

National Institutes of Health Academic Research Enhancement Award

(Deo, PI; Tucker, Co-Inv.)

11/21 - 07/31/22

\$35,000/year

Role of Cardiac Purkinje System in Long QT Syndrome

The long QT syndrome (LQTS) is a heritable or acquired cardiac disease characterized by prolongation of the QT interval on the ECG and increases the risk of developing spontaneous polymorphic ventricular tachycardia (VT) and sudden cardiac death in young patients. Our general hypothesis is that prolongation of inherently longer action potentials in the His-PS in response to loss of repolarizing current I_{Kr} together with modulation of electrical excitations within the PS network makes the ventricular conduction system a preferable arrhythmia-prone substrate in LQTS. A systematic study will be conducted to investigate the mechanisms by which PS contributes to arrhythmias (specifically LQT2) using experimental characterizations in transfected cardiomyocytes (CMs), 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.



The Lupus and Allied Diseases Association Board of Directors and friends with MMRI's Executive Director, Maria I. Kontaridis, PhD, Scientific Operations Manager, Jason McCarthy, PhD, and Postdoctoral Fellow, Samantha Le Sommer, PhD. Recently, the organization donated \$25,000 to MMRI's lupus research! We were so excited to give them a tour in September and talk more about our shared goal in helping improve the lives of those with lupus or an allied disease.



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We are so incredibly grateful for the generosity of Franklin Lodge #22 in Ballston Spa, NY. The lodge surprised Vice President of MMRI Board of Directors, RW Pat Imbimbo, with a \$10,000 donation to MMRI's autism research program! It's donations like this that make what we do possible.



MMRI joined in on the 200th anniversary celebration of the Royal Arch Masons Central City-Riverside Chapter, where MMRI was presented with a generous donation. We thank the chapter for all they have and continue to do in support of our mission.



Thank you to the Grand Lodge of Virginia A.F. & A.M. for hosting us at your Grand Annual Communication in 2021. We were honored to be presented with generous gifts from the Andrew Jackson Lodge and MMRI Board of Director member, RW Sheldon Richman. Dr. Maria Kontaridis also had the privilege of speaking at the lady's luncheon. It is always with much appreciation and excitement we can share our research and passionate mission with new audiences.

Pictured left to right is RW Robert A. Hewson, DPM, MMRI Board of Directors President, Maria I. Kontaridis, Ph.D., Executive Director, and WM Rick Cady, Grand Lodge of Virginia.



In May of 2021, NYS Senator Rachel May, Laura Martino, Director of Outreach for Madison & Oneida Counties visited for a tour of the newly renovated laboratories. Senator May has been instrumental in advocating financing options for MMRI, enabling further longevity of our important and ground-breaking research.

Pictured left to right is Anthony Cucci, Fraternal Relations and Development Associate, Anthony Villanti, Development, Marketing & Communications Director, Maria I. Kontaridis, Ph.D., Executive Director, Rachel May, NYS Senator, RW Robert A. Hewson, DPM, MMRI Board of Directors President, Jason McCarthy, Ph.D., Scientific Operations Manager and Associate Professor, and Laura Martino, Director of Outreach for Madison & Oneida Counties.

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Laura L. Sawyer

In Memory of Frank L. Schips, Jr.

Mary H. Schips

In Memory of Rohe & Esther Schneider

Joseph G. Leonelli

Memorial Tribute Contributions (continued)

In Memory of Bruce H. Schultz

Jeffrey H. Owen

In Memory of Walter A. Simpson

Roberta Simpson

In Memory of Melvin W. Sitts

Mary Lou Colbert & Peter Lanno

In Memory of Dale L. Smith

Karen Andre

In Memory of Carly M. Snyder

Warrensburg Lodge 425 F & AM

In Memory of Mary-Jo Sparks

Gary R. Adams

In Memory of Helen Spencer

Helga & Guenter Fielitz

In Memory of Sheldon D. Statchel

Rita Sherman

In Memory of Godfrey Stehli

James F. Stehli

In Memory of Ronald J. Steiner

Melvin J. Lipetz

Philip I. Pollak

Laurence Sussman

In Memory of Inez Steinhage

George D. Steinhage

In Memory of David W. Stevenson

Anonymous

Carrie Efinger

Lynnette Saeger

In Memory of Albert Timis

Anita & Irwin Ettlinger

In Memory of Kristin Marie Underkoffler

Carl F. Tomanelli

In Memory of Homer Vagelos

John Vagelos

In Memory of Arthur VanVranken

Harlan S. Barney, Jr.

In Memory of Luigi Vitullo

Geraldine & Benedetto Vitullo

In Memory of Norman E. Volk

Nancy E. Volk

In Memory of George E. Voulgaris

Suzanne M. Voulgaris

In Memory of Harold E. Waite

Elizabeth R. Waite

In Memory of Elizabeth F. Waldron

Frederick Waldron

In Memory of Albert R. Weaver III

Dawna Hohall

In Memory of Morris Weledniger

Anita & Irwin Ettlinger

In Memory of Ralph Wendel

Joan Wendel

In Memory of L. Katherine Wharmby

Anonymous

In Memory of Carl R. White

Marilyn & Donald Kimble

In Memory of Mary Widger

Onondaga Masonic District Charities

In Memory in Jacqueline Williams

Ronald R. Williams

Victoria & Scott Williams

In Memory of Adam Wohlfart

Joan Wendel

In Memory of J. Ralph Young

Gloria Jackson

Willard J. Jackson

Scipio Chapter #173 OES

Texas Tech University School of Veterinary Medicine

Lorraine & James Young

In Memory of Clairmont Zook

Nancy K. Zook

Honorary Tribute Contributions

In Honor of Miguel Acuna

David Chura

In Honor of the Alberta Chapter #1 Royal Arch Masons

David C. Hochman

In Honor of Maria Boyer-Jensen

Don Jensen

In Honor of Sal Conti

James Lawrence Thomas

In Honor of Raymond Covert

Justin C. Covert

In Honor of Gasport Lodge #787

Beth M. White

In Honor of Robert A. Hewson

Carolyn & Robert Pfeil

In Honor of Charles Jackson

Miriam Mass Jackson

The Prospect Hill Foundation

In Honor of Willard J. Jackson

Gloria Jackson

In Honor of Doug & Francis Jones

Patrick Murphrey

In Honor of James A. Kelly, Sr.

Exelon Corporation

Marilyn F. Kelly

In Honor of Maria Kontaridis

Anna & Paul D'Ambrosio

Terry Hilton

Melissa & Chris Kontaridis

In Honor of the Kosciuszko Lodge #1085

David Estes

In Honor of Nuvaire B. Lawson

Greg T. Lawson

In Honor of Mariners Lodge #67

Richard V. Goodwin III

In Honor of the MMRI Board of Directors

Albert J. Wright, III

In Honor of Mount Moriah Lodge #20

Jack E. Rucker

In Honor of Paralyzed Veterans of America

Ivan Novgorodskiy

In Honor of Kevin Ramos

Rod Sprattling

In Honor of Jose (Nicky) Rodriguez

Evelyn Torres

In Honor of Heather Roncone

Joan C. Bower

In Honor of Louis Rosenthal

John M. Leventhal

In Honor of Felix & Grace Rossabi

Meyer F. Rossabi

In Honor of David F. Schneeweiss

DF & HF Schneeweiss Charitable Trust

Hallie & David Schneeweiss

In Honor of Michael A. Shipman

Michael J. Finocchio

In Honor of Mr. & Mrs. Kyle Snow's Wedding

June M. Newsham

In Honor of South Shore Long Beach Lodge #1126

Frank Sforza

In Honor of Laurence Sussman

Harvey M. Holtz

In Honor of Gordon J. Whiting

Christopher L. Allen

MMRI Science in Action 21'



The modernization of our facility, science and technology transformed the Institute into a 21st century interdisciplinary, translational research facility. Our researchers have expanded their studies to incorporate, along with preexisting cardiac research, ways to combat diabetes and obesity, autoimmune disease, neurocognitive disease, and cancer. All this was made possible due to the philanthropic generosity of the Masonic Fraternity and our other benefactors, whose support is helping our scientists pave the way for future medical breakthroughs.

Dr. Khanh Ha, Postdoctoral Fellow, has been busy testing out our new Liberty Blue peptide synthesizer machine (pictured to the right). It is able to produce desired drugs by itself. Peptide based drugs are commonly used within our research programs – peptides have been found to lower high blood pressure, reduce inflammation, prevent blood clots, improve immune function, act as antioxidants, and more.

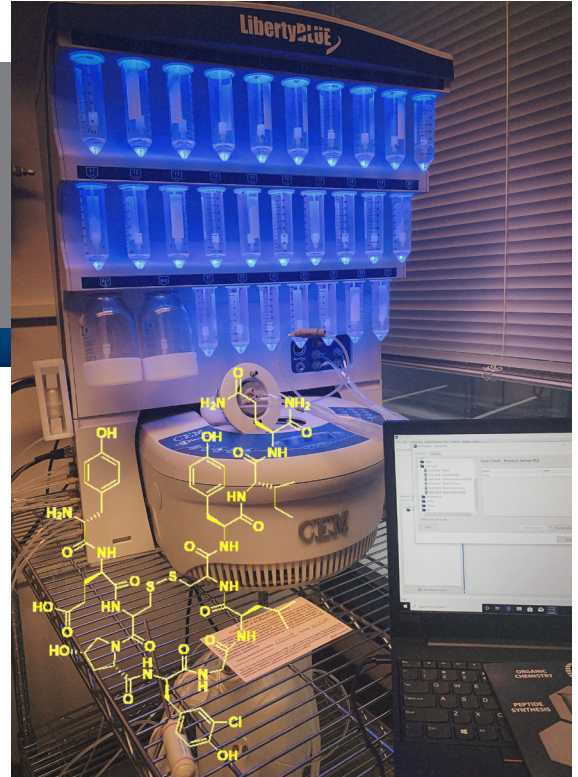
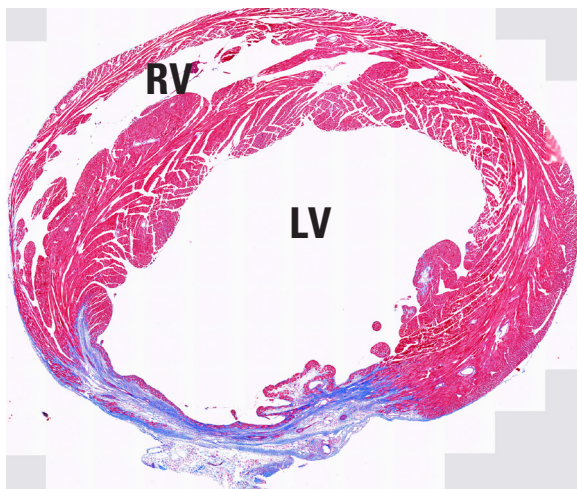


Image below taken by Dr. Sathya Dev Unudurthi, Instructor and FACS Core Manager.

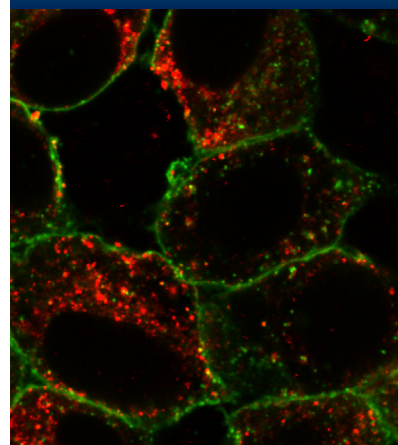
Key: "RV" Right Ventricle and "LV" Left Ventricle

This is a transverse section of mouse heart stained with Masson Trichrome staining. The pink areas represent health heart tissue, where as the blue areas represent fibrotic areas in the heart. Mice hearts subjected to surgical procedures like left anterior descending artery ligation enables us to simulate heart attack due to coronary blockage and study the effect of various genes in how the heart remodels after a heart attack.

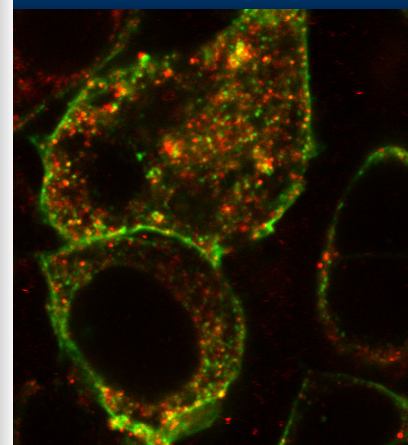


Images below taken by Gary Aistrup, Ph.D., Research Assistant Professor. The right image shows TRPM4 (green in all panels) primarily localizes to cell membrane (bright green peripheral outline of cells), as little co-localizes (yellow-orange merge of green and red) with an endocytosis marker protein, clathrin (red in right image). The left image SQT mutant TRPM4, through localizing to cell membrane, forms dense aggregates (bright green clusters), which typically consists of non-functional protein. These dense SQT-mutant TRPM4 aggregates show considerable co-localization with clathrin (orange-yellow in left image), thus much more than nominal endocytosis and removal from cell membrane.

Normal TRPM4:



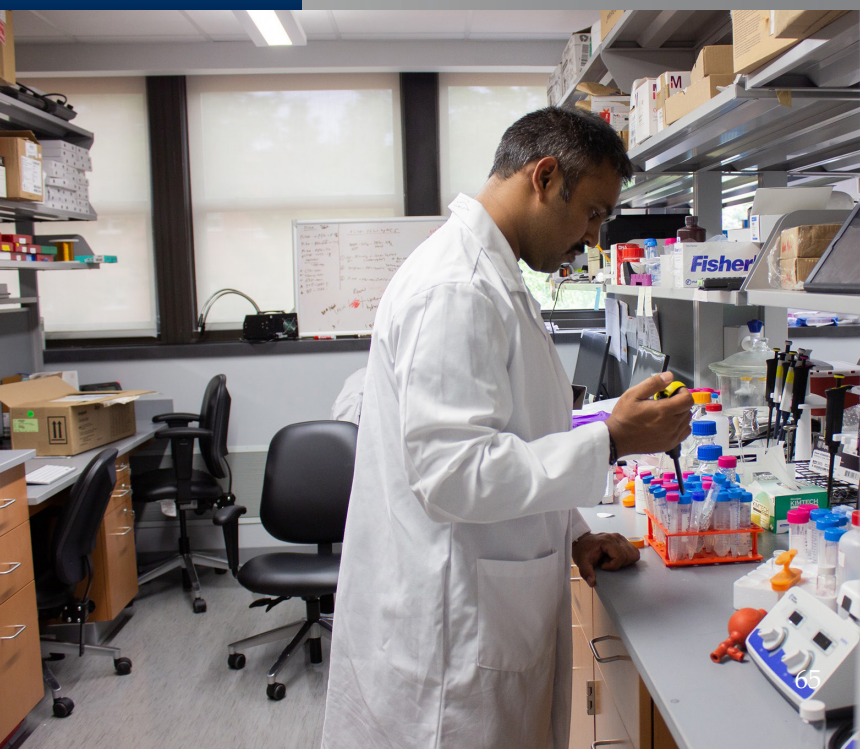
SQT Mutant TRPM4:

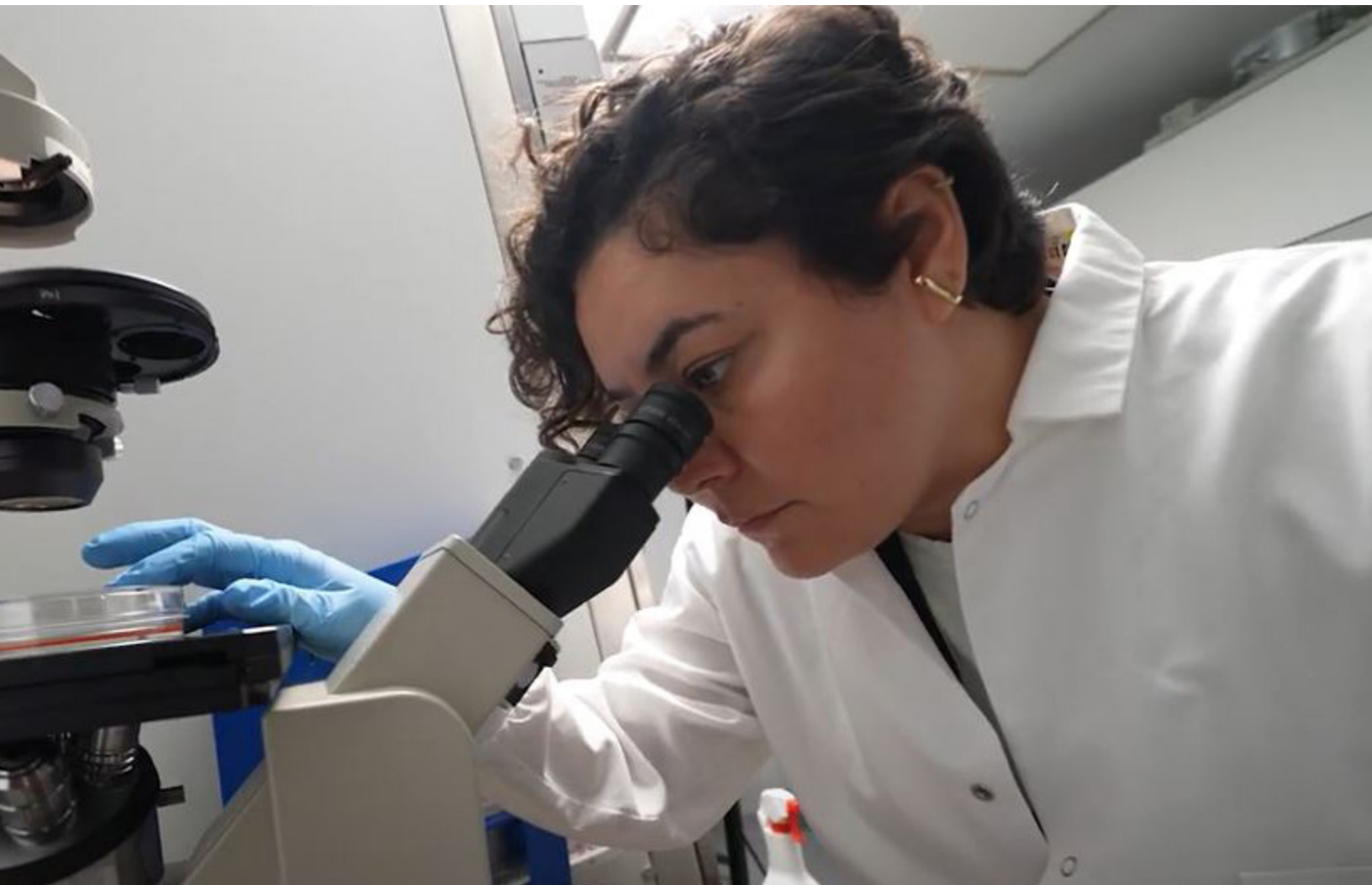




MMRI Awards Halfond-Weil Postdoctoral Fellowship

The Masonic Medical Research Institute (MMRI) proudly celebrates Dr. Jagathesh Chandra Bose Rajendran, who was recently promoted to Senior Nanomaterials Scientist within Dr. Jason McCarthy's laboratory, on his receipt of the 2021 Halfond-Weil Postdoctoral Fellowship. Sponsored by the 8th Manhattan District Lodge of the Grand Lodge of Free and Accepted Masons of the State of New York, this is the second annual competition for this grant, awarded to a top-talented research fellow at the MMRI for research excellence. Dr. Rajendran's proposal focused on the development of advanced materials capable of modulating the immune system. To do so, he used cell membranes to create hybrid drug delivery vehicles, mimicking the natural homing abilities of these cells. The ultimate goal of this proposal was to demonstrate that these materials offer new treatment options for systemic lupus erythematosus (SLE), in particular the kidney damage caused by this disease. While this proposal focused on SLE, the technology developed is expected to offer new avenues of treatment across autoimmune disorders.





Education and Training

MMRI is committed to providing education and training to basic scientists and clinical researchers. In 2021, MMRI was able to execute close partnerships with institutions throughout Central New York such as SUNY Polytechnic Institute, Hamilton College, SUNY Upstate Medical University, The Young Scholars Liberty Partnerships Program, and Basset Medical Center.



Class of 2021 Summer Fellows

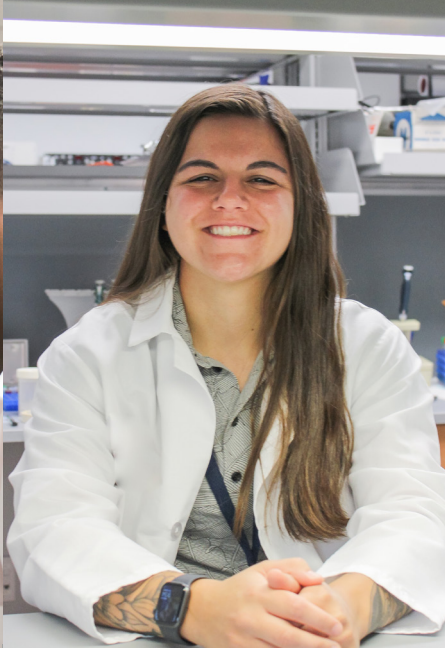
MMRI's Summer Fellowship Program, initiated in 1960, provides a research experience for undergraduate, graduate, and medical students. The ten-week program is designed to educate and instill scientific curiosity of fellows in biology, physiology, molecular biology, genetics, chemistry, drug-delivery, nanomedicine, and other life sciences. MMRI has hosted more than 400 Summer Fellows, with many returning for a second or third term. Participants have gone on to become physicians, surgeons, professors, researchers and administrators throughout the world.



Class of 2021 Young Scholars

We have also been proud to partner with the Utica College Young Scholar Liberty Partnerships Program, welcoming students for a 2-week introduction to scientific research. The program aims to motivate and encourage diverse and talented students to continue with further education, giving them access to academic, social, and cultural resources to better prepare them for real-world application. Students are exposed to internship opportunities, volunteer activities, academic resources, and more.

Top image: MMRI 2021 Summer Fellows (Front Row, pictured left to right): Joseph Hoskins, Katherine Nelson, Joseph Wu. (Middle Row, pictured left to right): Emily Marshall, Emma Zupan, Samantha Tavarez. (Top Row, pictured left to right): Yuriy Milobog, Vaea Salt-Bernard, Peiyang (Maurice) Tang, Katherine Jankowski.
 Bottom left image: MMRI 2021 Young Scholar, Che Ku Kyet from Colgate University.
 Bottom right image: MMRI 2021 Young Scholar, Sandy Thai from Hamilton College.



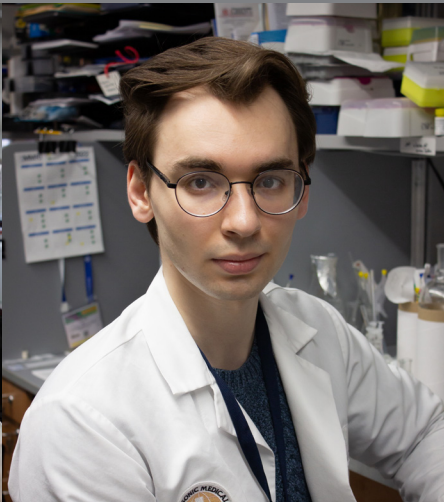
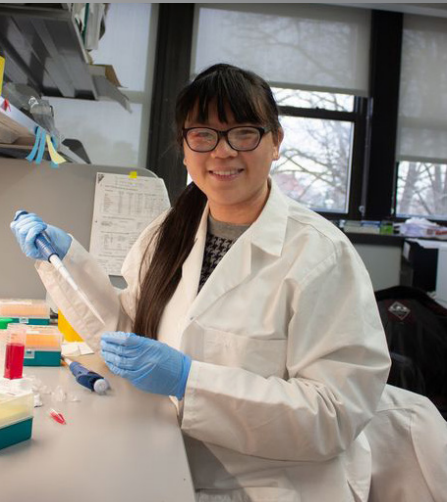
Visiting Students Gain Hands-On Experience

Under the tutelage of Dr. Makarand Deo, Associate Professor at Norfolk State University, and long-time collaborator of Dr. Jon Cordeiro, Assistant Professor at MMRI, graduate students Anthony Owusu-Mensah (Pictured top right) and Vicky Lam (Pictured top middle) joined MMRI for two weeks in early August to conduct electrophysiology experiments on a joint project. Both students work in a lab at Old Dominion University, where they are responsible for translating biological scientific data into mathematical models.

Independent Study Students

Each year, MMRI is proud to host a select group of talented and ambitious students for their Summer Fellowship Program. From here, students have gone on to become doctors, nurses, research scientists, professors, and more! For some students, however, this is not enough. They are excited about their projects, and they seek opportunities to continue their work well beyond their fellowship tenure. We were excited to welcome back Yuriy Milobog and Katherine Nelson, both Summer Fellow 2021 alums.

Pictured bottom left is Katherine Nelson, senior at Vassar College; pictured bottom middle is Yuriy Milobog, senior at SUNY Polytechnic Institute.



From Intern to Full Time Employee

Donna Le, Research Assistant (pictured above), first joined MMRI the summer of 2019 as part of the Young Scholars Program. This past summer, she successfully graduated from Hamilton College with a bachelor's degree in Biochemistry/Molecular Biology and a minor in Sociology, and excitedly returned to MMRI to further her experience with research and contribute to the important work being done at the Institute. In the future, Donna plans to apply to medical school. We are always delighted to welcome back interns of the past and continue educating and helping shape their bright futures!

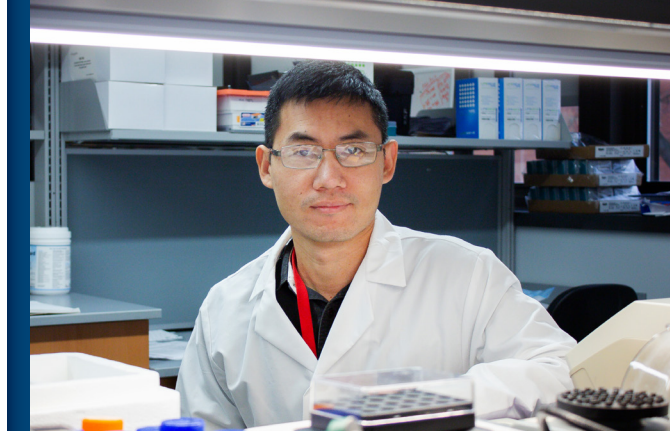


American Heart Association Diversity Supplement Award

Dr. Luana Nunes Santos was awarded a \$133,480 diversity supplement award from the American Heart Association (AHA) for her role in MMRI's autism research project. The grant, which promotes diversity and excellence in science, supports the ongoing investigation as to whether a connection exists between the development of heart disease and autism.

"I am honored to have been awarded this grant and given the opportunity to continue working towards my dream. As a woman in science who is also from South America, it means a lot to have this support. It is the first check on the list to one day becoming an independent scientist and have my own lab," said Dr. Nunes Santos.

Pictured left is Dr. Luana Nunes Santos.



National Institutes of Health R01 Research Grant

Dr. Zhiqiang Lin was awarded a \$3.2 million grant from the National Institutes of Health to support his research on heart disease and inflammation. In the United States, an individual will experience a heart attack every 40 seconds (CDC.gov). As a result, the body mounts an inflammatory response to heal the injury. However, while initially protective, over time, excessive inflammation can cause even more damage to the tissue, contributing to heart muscle cell death and to an overall weakening of the heart itself. "Our research focuses on discovering new ways to prevent heart muscle death and reduce injury after a heart attack. Our ultimate goal is to discover new drugs that can reduce damage and increase healing," said Dr. Lin.

Pictured above is Dr. Zhiqiang Lin.

MMRI Wins Prestigious Grant Awards

In 2021, MMRI was proud to be the recipient of several prominent awards within the scientific community. The support of which, recognizes the high-caliber of MMRI, the belief in our mission to improve the lives of all humankind, and our ability to achieve this.



Department of Defense Lupus Impact Award

Dr. Maria I. Kontaridis was the proud recipient of the Department of Defense (DOD) Lupus Impact Award, totaling \$750,000. This project and award were in part made possible by generosity from the Order of the Eastern Star and support from MMRI's Board of Directors, for believing in the research and providing the seed money necessary to generate the preliminary data needed to prove feasibility of studies. Dr. Samantha Le Sommer, a postdoctoral fellow in the Kontaridis laboratory at MMRI, will also take lead on the study, working to understand the causal mechanisms leading to the onset of lupus.

Pictured left: Dr. Maria I. Kontaridis and Dr. Samantha Le Sommer.



Lupus and Allied Diseases Association, Inc. Award

MMRI and the Lupus and Allied Diseases Association (LADA), an all-volunteer national patient advocacy organization, re-connected, thanks to news of Dr. Maria I. Kontaridis' receipt of the Lupus Impact Award from the Department of Defense. MMRI then attended LADA's Annual Lupus Charity Golf Classic event in August, where we were honored to be the proud recipient of a \$25,000 award for the continuation of our lupus research.

Pictured right: MMRI poses for photo with Kathleen Arntsen, LADA President and CEO, at LADA's Annual Lupus Charity Golf Classic.

MMRI Certifications

In 2021, with the help of Mr. Damian Bohler, Animal Facilities Manager (pictured right), Ms. Laura Coon, Sr. Animal Care Technician (pictured left), and Dr. Robert Quinn, Animal Care Veterinarian Consultant, MMRI received a very prestigious Association for Assessment and Accreditation of Laboratory Care International accreditation.



Teaming Up For A Better CNY

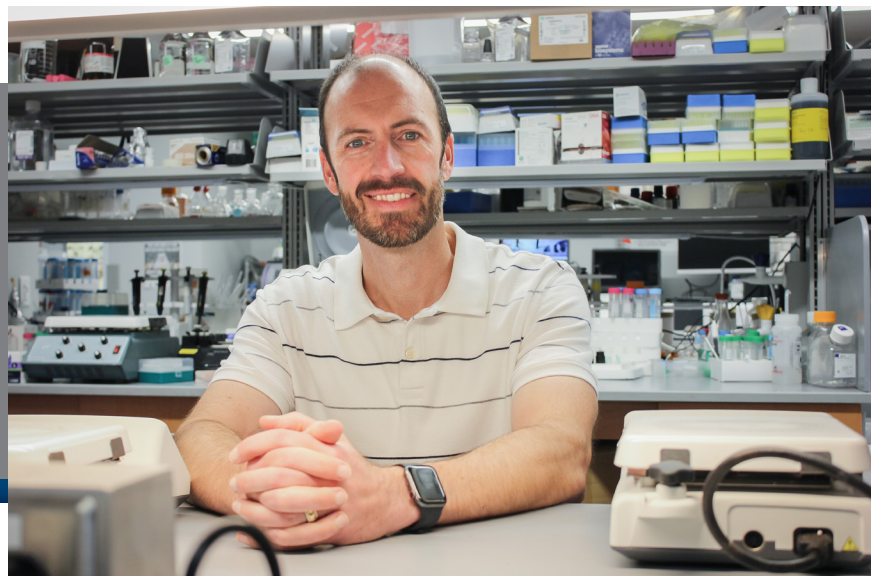
In the Fall of 2021, MMRI announced it's partnership with the Bassett Healthcare Network! Together, our organizations will further the advancement of health research and outcomes in Central New York (CNY) and beyond.

Pictured from left to right is Dr. Tommy Ibrahim, President of the Bassett Healthcare Network, Dr. Maria I. Kontaridis, MMRI Executive Director, and Dr. Henry Weil, Physician at Bassett Healthcare Network.

McCarthy Lab Creates Tools For Clinicians In Point-Of-Care Use

In June of 2021, the McCarthy Lab published a paper in ACS Sensors and was recognized as an ACS Editor's Choice Article. In collaboration with researchers from Massachusetts General Hospital, they developed a new imaging agent to detect activated platelets after stent procedures. This tool has the potential to enable clinicians to proactively treat patients before the development of occlusive stent clotting or scarring, as opposed to reactively, when the patient is symptomatic.

Pictured right is Dr. Jason McCarthy, co-senior author on the manuscript.



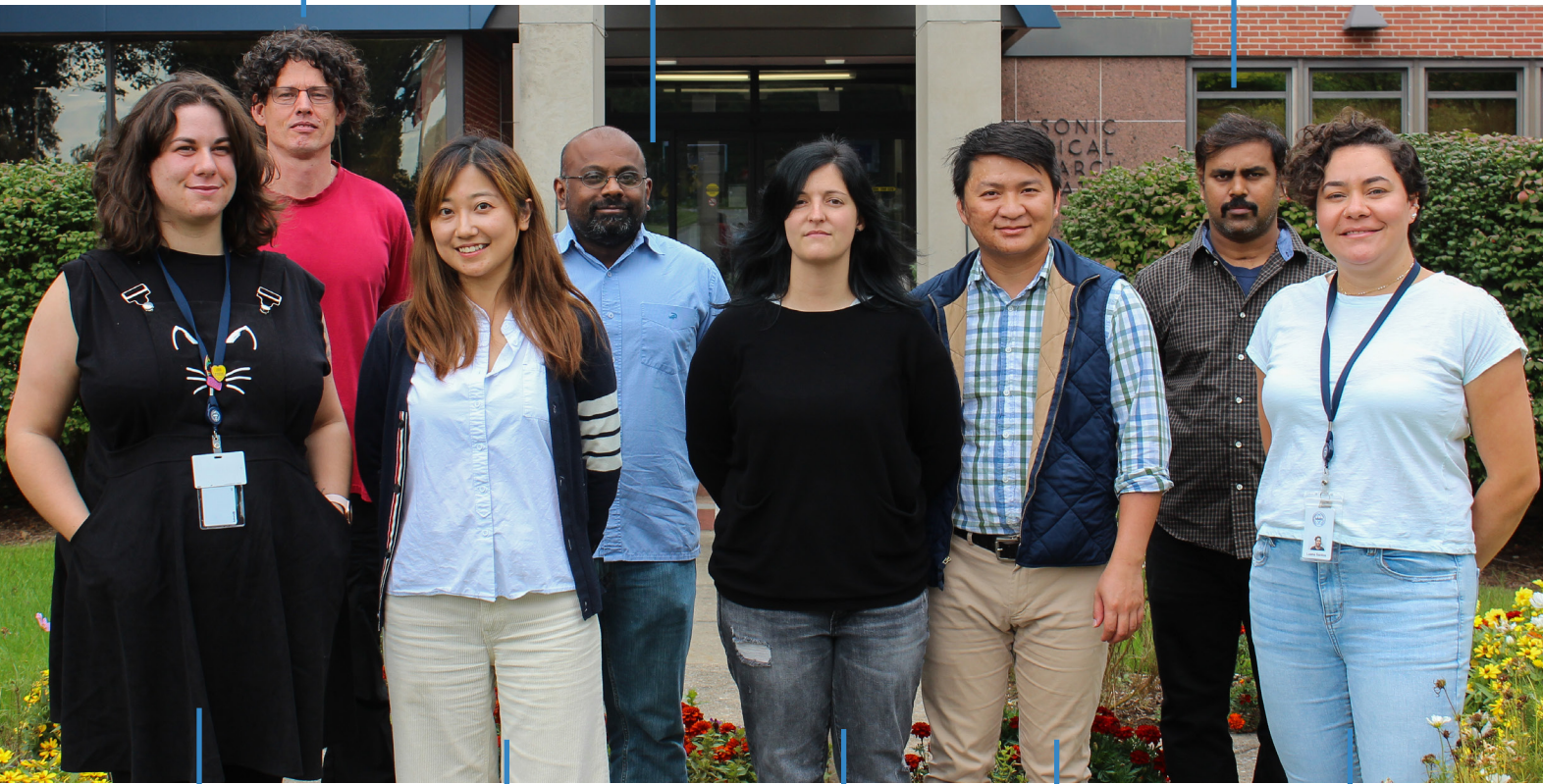
MMRI's Postdoctoral Fellows

Postdoctoral Fellows are an integral part of scientific research and in 2021, we doubled our postdoc team from 4 to 8! Meet our postdocs below.

DR. MYLES HODGSON
Cardio-oncology

DR. SARAVANAKKUMAR CHENNAPPAN
Genetic Disorders

DR. JAGATHESH CHANDRA BOSE RAJENDRAN
Nanomedicine



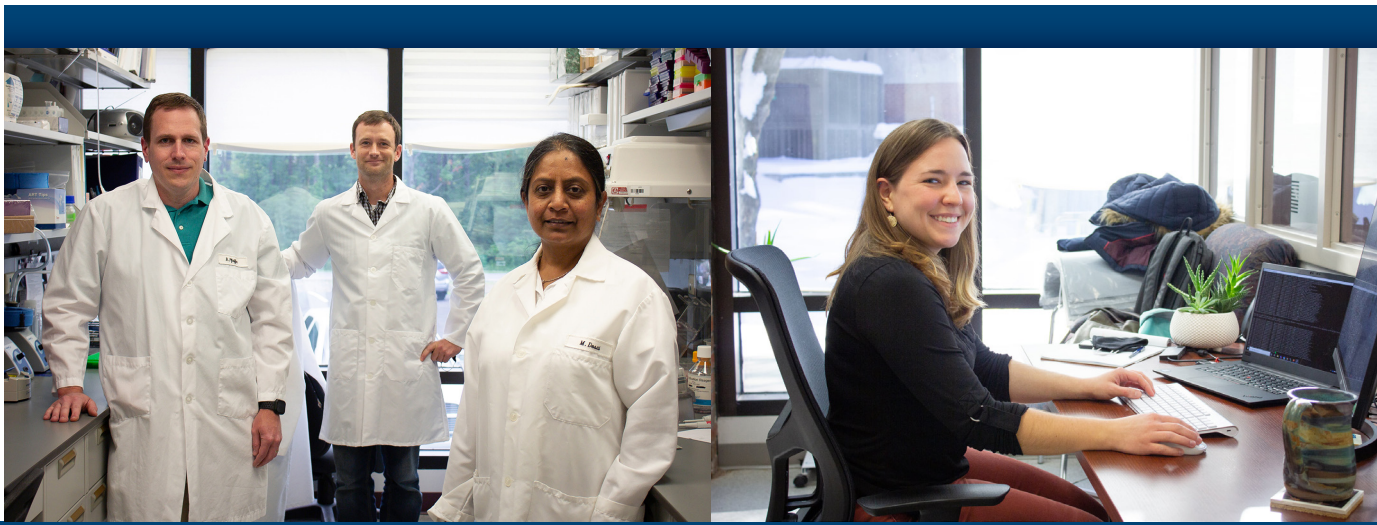
DR. SAMANTHA LE SOMMER
Lupus

DR. JOYCE BERNARDI
Cardiac Arrhythmias

DR. LUANA NUNES SANTOS
Autism / Congenital Heart Disease

DR. YAN SUN
Diabetes / Heart Disease

DR. KHANH HA
Chemistry



Better Together: MMRI and MVHS

MMRI's partnership with the Mohawk Valley Health System (MVHS) began in June 2020. The Tucker Lab tirelessly dedicated their time to processing all PCR COVID-19 tests for the health facility up until June 2021. Over the course of a year, close to 50,000 tests were processed.

Pictured above, left to right: Members of the Tucker lab include, Ryan Pfeiffer, Research Associate; Nathan Tucker, Ph.D., Assistant Professor; Mayurika Desai, Research Assistant; and Michelle Hulke, Associate Computational Biologist II.

MMRI in the Community 21'

Worry Stones To Help You Worry Less

In July of 2021, Monica Sandu and her son Nicholas generously made numerous "worry stones" for kids with autism. Each stone is accompanied by a textured fabric piece. We were grateful to be able to present these to our friends at the Kelberman Center.

Pictured below from left to right: PGM MW William M. Sardone, Nikolas Sandu, Monica Sandu, and Dr. Maria I. Kontaridis.



Leadership Mohawk Valley Tours MMRI

In December, The Center for Leadership Excellence at Mohawk Valley Community College joined MMRI for a presentation, riveting Q&A, and a tour of the state-of-the-art research facility.



MMRI Dedications

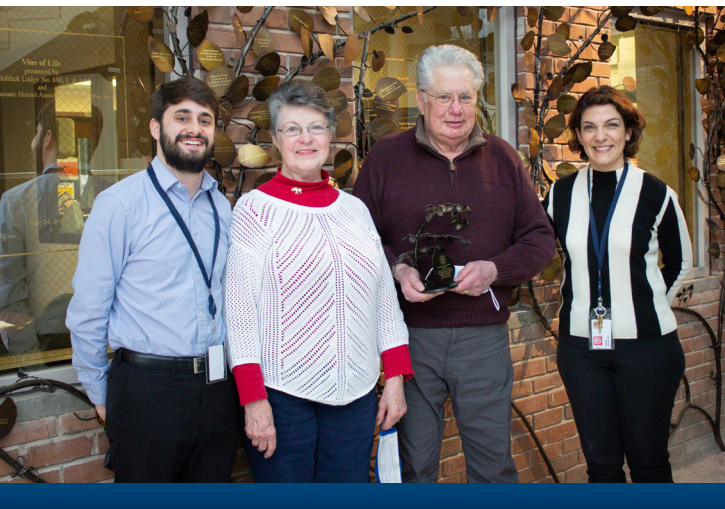
In the Summer, we celebrated and thanked both RW David F. Schneeweiss, Past President, and Chairman of the MMRI Board of Directors, his wife, Mrs. Hallie Schneeweiss, and the Grand Chapter State of New York Royal Arch Masons (RAM), for their generosity in making possible renovations of the facility. In honor of the Schneeweiss, ME David H. Raymond, and ME Paul G. Huck, both Past Grand High Priests of RAM, we held a dedication ceremony in which we presented each with a plaque to name the newly renovated spaces.



Pictured middle, left to right: Dr. Maria I. Kontaridis, Executive Director at MMRI, RW David F. Schneeweiss, Past President, and Chairman of the MMRI Board of Directors, Mrs. Hallie Schneeweiss, and PGM MW William M. Sardone.

Pictured right, left to right: MW Jeffrey Williamson, RW Robert A. Hewson, DPM, RW Alvaro F. Quiroga, ME Paul G. Huck, Dr. Maria I. Kontaridis, ME Brian D. Singer, and PGM MW William M. Sardone.

21' MMRI and the Masonic Tradition



MMRI Honors RW James D. Swan, Jr.

In the Spring of 2021, we celebrated RW James D. Swan Jr., Secretary of MMRI Board of Directors, for his tireless contributions to MMRI by presenting him with an honorary leaf on our Roswell T. Swits Vine of Life. His dedication to the institute within the past 5 years has been inspiring. As chair of our Building and Grounds committee, RW Swan has been leading MMRI in our multi-year transformation. The renovations and improvements of our facility could not have been done without the expertise, time, and support of RW Swan.

Pictured left, left to right: Bro. Anthony Cucci, Fraternal Relations and Development Associate at MMRI, Mrs. Sharon Swan, RW James D. Swan Jr., MMRI Board of Directors Secretary, and Dr. Maria I. Kontaridis, Executive Director at MMRI.



Unlocking The Possibilities With MMRI Board Of Directors

Pictured left to right: In May, MMRI Board of Directors welcomed two new members, RW Frank R. Williams and RW Paul E. Mossberg, along with newly appointed President, RW Robert A. Hewson, DPM, and Vice President, RW Pasquale Imbimbo, Jr.



JOIN MMRI

A Cornerstone Tradition.

**UNLOCK THE POSSIBILITIES OF
TODAY AND TOMORROW.**

"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. 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."

Frank R. Williams
MMRI Board of Directors Member



TELL US ABOUT YOUR GIFT

CONFIDENTIAL



Thank you for your generous bequest commitment to the Masonic Medical Research Institute. Your legacy gift will help us plan for the future as we work to find solutions to the world's most challenging diseases.

Please take the time to fill out this form so we can better understand your intentions for your gift. The information you provide is not legally binding and we understand that you may wish to change your gift in the future.

Questions? Please contact our Gift Planning Department at 1-315-624-7492 or 1-908-477-7966 or email: development@mmri.dev.

Name(s): _____

Year(s) of Birth: _____

Address: _____

Phone: _____ Email: _____

You will receive occasional email updates from MMRI. We will not sell, rent, or exchange your email address.

ABOUT YOUR GIFT

If you are willing to disclose more information about your gift, please check all that apply and estimate the value of each gift in today's dollars.

- | | |
|---|--|
| <input type="checkbox"/> Will: \$ _____ | <input type="checkbox"/> Insurance Policy: \$ _____ |
| <input type="checkbox"/> Revocable Living Trust: \$ _____ | <input type="checkbox"/> Real Estate: \$ _____ |
| <input type="checkbox"/> Charitable Remainder Trust: \$ _____ | <input type="checkbox"/> Retirement Plan/IRA: \$ _____ |
| <input type="checkbox"/> Other Asset(s): \$ _____ | \$ _____ |

You can indicate that your gift be used for the Masonic Medical Research Institute's priorities* or for a specific area of research that matters to you (these include research in the areas of cancer, autism, heart disease, lupus and diabetes/obesity, among others).

Would you like your gift to be used for a specific purpose: Yes No

If you checked yes, please tell us how to direct your gift: _____

**The Masonic Medical Research Institute uses charitable gifts to support all of its research priorities unless otherwise specified by the donor.*

ADDITIONAL INFORMATION

Is your gift contingent? Yes No If yes, please explain: _____

How would you like to be recognized for your gift?

- I/We would like to be listed as (a) Cornerstone Society member(s), which may include listing my/our gift within a dollar range. Please list my/our name(s) as: _____
- I/We prefer that my/our gift not be listed within a dollar range, but you may list my/our name(s) as (a) Cornerstone Society member(s). Please list my/our name(s) as: _____
- I/We wish to remain anonymous for this gift.

SIGNATURE(S): _____

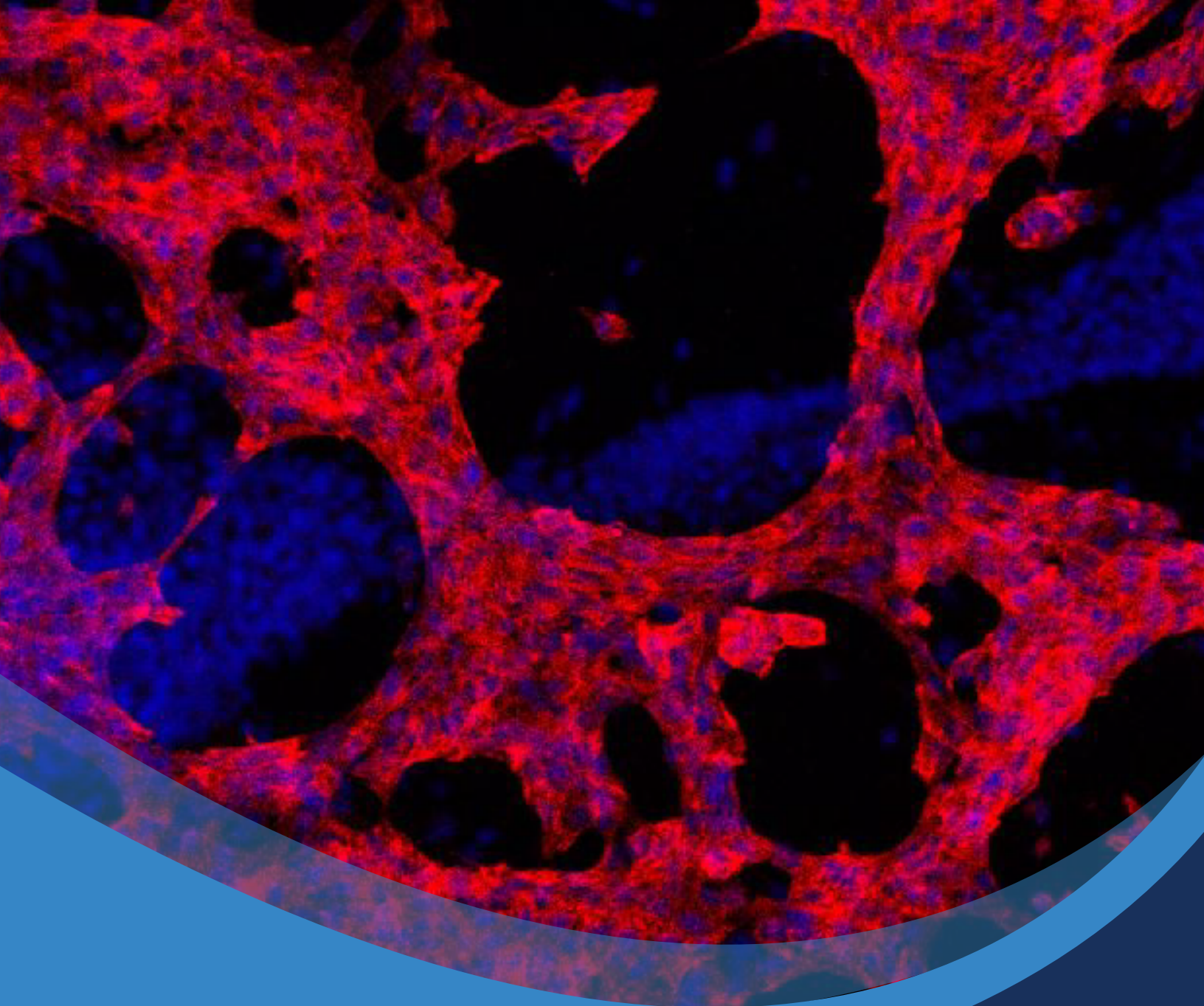
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UTICA, NEW YORK 13501



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