Minneapolis Heart Institute Foundation®

IMPACT REPORT Spring 2022

Committed to Our Mission: To improve the cardiovascular health of individuals and communities through innovative research and education

MHIF RESEARCH HIGHLIGHTS

MHIF Heart Rhythm Center Researchers Publish Case Study on Variant of Rare Genetic Heart Muscle Disorder

Electrophysiology researchers in MHIF's new Heart Rhythm Center recently published a case report in the *Journal of the American College of Cardiology* about two siblings, ages 19 and 20, with desmoplakin cardiomyopathy. The condition is a rare variant of arrhythmogenic cardiomyopathy, which is an inherited heart muscle disorder that can cause sudden cardiac death, particularly in young patients and athletes. Patients with the condition typically show signs of ventricular arrhythmias or progressive heart failure.

In the case of the two siblings, however, both presented at the hospital just four months apart with signs and symptoms mimicking an acute heart attack — chest pain, troponin I elevation, and ECG changes. Both were found not to have any blockages in their heart and prior to their episodes, both were asymptomatic. The MHIF research team published the case study to help fellow physicians understand that what looks like a heart attack isn't always a heart attack, so familial arrhythmogenic cardiomyopathy should be considered in certain situations.

MHIF Heart Rhythm Center researchers have studied arrhythmogenic cardiomyopathy and its variant for years as part of their work with the Minneapolis Heart Institute® Genetic Arrhythmia Center, which is a unique multi-disciplinary clinic that integrates world-class clinical care, genetic counseling and clinical research for patients and families facing cardiac conditions that predispose them to sudden cardiac death and cardiac arrhythmias. The research has allowed them to test family members and identify who would benefit from receiving a lifesaving internal cardiac defibrillator (ICD).

By studying genetic disorders that are not well understood and for which treatment remains uncertain, Heart Rhythm Center researchers can help bring hope and answers to patients and families and prevent a life-threatening event from occurring in other family members. *Continued on next page*

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HOPE DISCOVERED HERE™

MHIF Research Highlights Continued from front cover

Research Related to Patient Care and Outcomes in Treating Life-Threatening Aortic Dissection

The Minneapolis Heart Institute Foundation® (MHIF) announced the publication of research showing improved patient outcomes and significantly decreased 30-day mortality in aortic dissection patients managed through a unique comprehensive care strategy designed by a team with multidisciplinary expertise. Research is often focused on a new technology or technique; this research highlights the importance of the process, protocol and expertise involved in determining the care pathway for patients that can lead to the best outcomes for all involved, even in cases where more complex repairs were performed. The manuscript, "Impact of a multidisciplinary acute aortic dissection program: Improved outcomes with a comprehensive initial surgical repair strategy," was published in the *Journal of Vascular Surgery*.

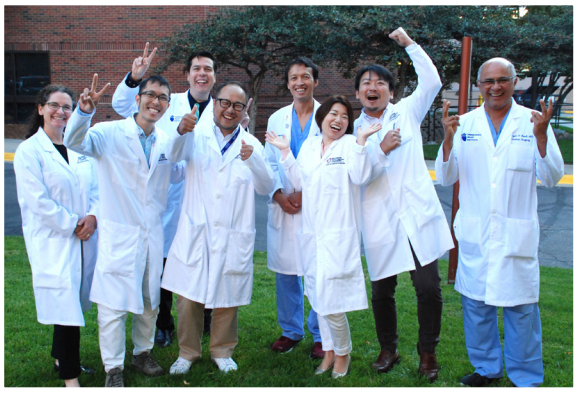
"Several years ago, we formed a multidisciplinary acute aortic program that showed we could impact the time to diagnose and treat this lethal condition," said Kevin Harris, MD, cardiologist and researcher, MHIF. "This new published analysis looks at the outcomes when the strategy changed a couple years ago where the vascular surgeons routinely joined the cardiovascular surgeons in the initial evaluation, and often treatment, of the patients with type A dissection involving the aorta closest to the heart. Due to the efforts of our talented cardiovascular and vascular surgeons, we have seen more patients get lifesaving surgery, the surgery is more comprehensive, and surgical mortality has dramatically decreased."

MHIF Researcher Scholars Publish Research Related to Cardiovascular Imaging and TAVR Outcomes

Exciting to see the work of the MHIF international scholars as they research the importance of cardiovascular imaging in evaluating TAVR outcomes. Congrats to MHIF Scholar Miho Fukui her colleagues and physician mentors!

Published in the European Heart Journal: "Association of baseline and change in global longitudinal strain by computed tomography with post-transcatheter aortic valve replacement outcomes" https://bit.ly/3261OBm

Published in the Journal of Cardiovascular Computed Tomography: "Right ventricular dysfunction by computed tomography associates with outcomes in severe aortic stenosis patients undergoing transcatheter aortic valve replacement" https://bit.ly/3FohI8E



MHIF International Research Scholars with the Valve Science Center team.

MHIF Scholar Miho Fukui leading moderated poster session at the Transcatheter Therapeutics (TCT) conference 2021.

MHIF Scholars and members of the research team at TCT 2021.

Dr. Haq

Dr. Ayman Haq Joins MHIF as First Fellow in Cardiovascular Prevention

On July 1, MHIF was pleased to welcome Dr. Ayman Haq as its first-ever cardiovascular prevention fellow in the Nolan Family Center for Cardiovascular Health. Dr. Haq joined MHIF after completing his three-year residency in internal medicine at Baylor University Medical Center and serving as an adjunct instructor at Texas A&M College of Medicine. He received his medical degree from Texas Tech University Health Sciences Center School of Medicine in 2018 along with a Certificate in Medical Humanities and Bioethics. He earned his bachelor of science degrees in biology and business administration from The University of Texas–Dallas.

From Iowa to Abbott for a Lifesaving Procedure for Aortic Dissection

Randy White, Grateful Patient

Randy White, 62, lives in a small town in Iowa and has always been healthy with no significant family history of cardiovascular disease. His heart journey began in early 2020. He was semi-retired and helping a friend renovate houses. He happened to be home one Saturday morning washing windows.

"It felt like somebody took their fist and run it up from my stomach to the top of my throat, I got real sweaty and shaky, and my chest hurt bad," said Randy. "The next thing I know, I'm in the hospital."

Randy's left side went numb and he thought he was having a heart attack. At the local hospital emergency room (ER), the doctor on duty was asking questions and beginning her investigation. Randy went for a CT scan to try to figure out the problem.

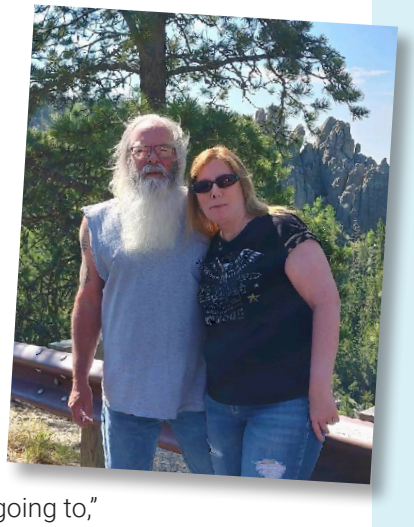
"The doctor came back to talk to my wife and I and she asked me if I believe in God," said Randy. "I said, yes I do. She said you better start praying because this is not good."

Randy had an aortic aneurysm caused by an acute aortic dissection (tear in the vessel). They needed to quickly find a hospital with the capabilities to do the surgery necessary to fix the tear and save Randy's life. The doctor called nine hospitals throughout Iowa, South Dakota and Minnesota before they connected with the Minneapolis Heart Institute® at Abbott Northwestern Hospital, where there was a team of doctors with the expertise and capabilities to do the surgery.

A transfer team from Sioux Falls arrived to take Randy, and after the doctors at their local hospital declined to take him based on the severity of his case, they agreed to transport him to Minneapolis. His heart journey began at 9:30 a.m. and he arrived at Abbott at 4:00 p.m. Randy's wife Betty drove to Minneapolis, picking up their daughter along the way. They had no idea what was going to happen, other than knowing it was an emergency and Randy needed surgery.

"I didn't think I was coming home," said Randy. "I remember in the middle of the night I was still, and we've now figured out that's when my wife and daughter arrived. I couldn't talk, but I could hear the doctors talking and I know sign language, so I started signing, 'Am I dying?' I heard one of the doctors ask what I was doing. They looked it up on their phone and a hand touched my shoulder and they said, 'No, you are not dying.' I met that doctor two days later."

Randy's aneurism was located on the main artery that comes out of the top of his heart. It was caused by an aortic dissection that didn't break through all the layers of the vessel, which is how he survived to get to his procedure. Only a small percentage of people like him make it to the operating table and an even smaller percentage make it through the complex surgical procedure, but Randy was out of the hospital in less than a week.



Randy appreciates the care he received from the ER to the flight crew, and to the multi-disciplinary team of imaging experts and cardiac and vascular surgeons at Abbott who created a plan and provided the life-saving surgery. He knows it all began with the dedication of the ER doctor who works weekends.

"Her name's Sally and I haven't seen her yet, but I'm going to," said Randy. "If she hadn't picked up on what was going on with me like she did, I wouldn't be here. I've seen doctors more in the last four weeks than I've seen in my life and everybody at Abbott that helped me, they were just awesome people."

His doctors tell him it could be a year of recovery and he understands he needs to take time to heal from the procedure that involved a complicated repair of his aorta done through an open-heart procedure. He also encouraged his brother to see a doctor and make sure he understands any hereditary risks and receives the testing that is available today. Randy is a living example of the care and outcomes that exist today for aortic dissections because of world-class cardiovascular research.

"I understand that nobody can tell how I'm going to heal," said Randy. "I don't like being in the hospital, but they are wonderful places to be when you need them. From what everybody has told me, I'm a miracle. Every day gets a little better."

MHIF Welcomes Back Summer 2021 Research Interns to In-Person Experience

Over the summer, MHIF was excited to once again welcome 12 undergraduate students from across the country to a fully in-person 12-week Clinical Research Internship Program. Each year, MHIF continues to have the privilege of selecting interns from a very strong pool of candidates from across the U.S. who are pre-med or planning a career in medicine. Interns are paired with Minneapolis Heart Institute® physician mentors and have the opportunity to participate in groundbreaking physician-initiated research projects that are presented at the end of the summer. Many projects result in the intern having the opportunity to be an author on an article published in a national scientific journal, and some interns also have the opportunity to present their work at a national cardiovascular conference.

> "There isn't another internship opportunity for undergraduates that offers such a robust experience."
>
> —Intern Thomas Basala

Intern Thomas Basala said, "I wanted to participate in this internship because MHIF researchers and practitioners have an admirable record of excellence in research pursuits, innovation and patient care. I believe that all these factors can be cohesive with each other, and this experience offers me the best opportunity to learn more. This internship offers a unique experience to deeply learn and engage in mentorship with a full clinical research team (physicians, research nurses, biostatisticians, etc.) while also shadowing practitioners in all facets of cardiology. There isn't another internship opportunity for undergraduates that offers such a robust experience."

Ananya Shah, who returned as lead intern for 2021, said, "After last summer's MHIF program, I became very excited about the potential to be a physician researcher. My experience through the unique internship program helped solidify my commitment to pursue a career in service as a lifelong learner and educator."

Ultimately, the goal of MHIF's internship program is not only to develop, but also empower the next generation of health professionals. Asked about the highlight of his experience, intern Alex Gutierrez shared, "Getting to write case reports, an abstract, and a paper prepared me for not only scientific writing but gave me the confidence to take on new projects, no matter how intimidating."

This cutting-edge educational experience is made possible by the generous contributions of individual donors, local foundations and industry organizations who share in the belief that hands-on experience is critical for tomorrow's leaders. Financial support from donors means interns can work with both a staff and a physician mentor to learn about the research process and cardiology. In addition, contributions make enrichment experiences such as guest speakers and field trips possible.

Our sincere thanks to the generous corporations, foundations and individuals that have helped to underwrite the MHIF Research Internship Program!

The 2021 class of research interns and their research projects

Ananya Shah (lead intern): Clinical Characteristics and Outcomes of Patients with Myocardial Infarction with No Obstructive Coronary Arteries (MINOCA) Presenting with ST-Segment Elevation; MHI Clinical Experience with a Leadless Intracardiac Pacemaker Implantation

Vennela Avula (Cline and Dianne Hickok Intern): Incident, Treatment and Outcomes of Coronary Artery Perforation during Percutaneous Coronary Interventions: Insights from the PROGRESS- COMPLICATIONS Registry

Aaron Bae: Pulmonary Hypertension in the Setting of Hemodialysis Arteriovenous Fistulas: Natural History and Outcomes; Pulmonary Hypertension in Rural Minnesota

Thomas Basala (Sheldon Z. Wert Intern): Neochordal Replacement versus Leaflet Resection for Surgical Mitral Valve Repair

Marissa Dulas: The Cardiovascular Complications Associated with COVID Mortality in the Metro Allina Health System

Alex Gutierrez (Rose Peterson Memorial Intern): Outcomes of Patients Undergoing Bifurcation Vs Non-Bifurcation in Percutaneous Coronary Intervention (PCI)

Anais Marenco: Patients Hospitalized for COVID-19 within Allina Health – American Heart Association COVID-19 Cardiovascular Disease Registry

Riya Pillai: Clinical Presentation and Classification of Patients Undergoing Evaluation for Cardiac Sarcoidosis

Anish Sethi: Multi-LEAD ECGs for Measuring Electrical Synchrony in Patients with Heart Failure and Implantable Cardiac Resynchronization Therapy Devices

Joseph Verry (Pete Pierce Intern): Heart Failure Medications are Associated with Long-Term Improvement in LV Systolic Function in Patients with Chemotherapy-Induced Cardiomyopathy

Julia Wang: Renal Artery Vasculopathy. Single Center Case Study

Kathryn Xu (Richard Kantrud Intern): Harnessing Big Data to Track Quality for Electrophysiology Procedures; Magnetic Field Interference Between Electronic Gadgets and Cardiac Rhythm Devices

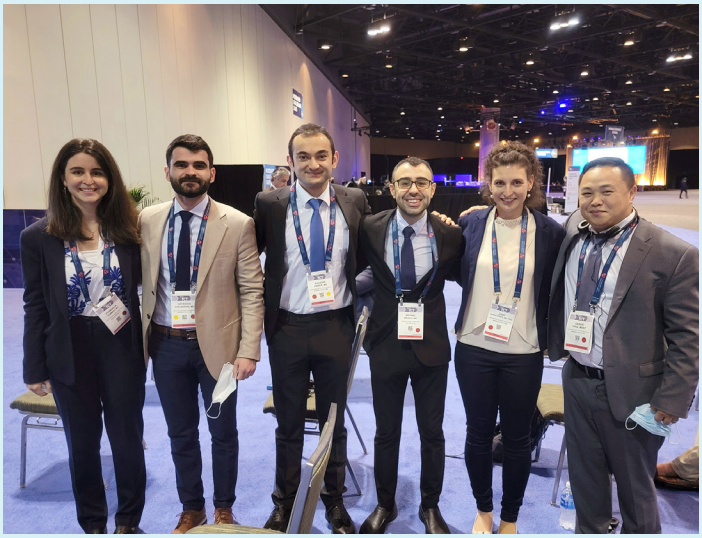
Announcing the Frank J. and Eleanor A. Maslowski CTO-CHIP Fellowship

The Frank J. and Eleanor A. Maslowski Charitable Trust recently made a generous gift to MHIF to establish the Frank J. and Eleanor A. Maslowski CTO-CHIP Fellowship in the Center for Coronary Artery Disease (CCAD). The gift represents a five-year commitment to create a hybrid fellowship in partnership with the Minneapolis Heart Institute® (MHI®) to focus on chronic total occlusions (CTOs), which are complete blockages of a coronary artery for 30 days or longer that are challenging to treat with conventional techniques and tools.

Frank J. and Eleanor A. Maslowski were early investors in Medtronic and the family established the charitable trust in 2011 to help support critical medical research. Mary Maslowski and her fellow trustees are ensuring that her parents' philanthropic legacy continues through this and other critical coronary artery disease research at MHIF.

"We are grateful to Frank and Eleanor Maslowski for their generous support of a new fellowship focused on important CTO research. Having a fellow allows us to continue our commitment to sharing our research and learnings with a new generation of health care providers, and allows us to add a fellow who brings their own wealth of knowledge, as well as tremendous drive and motivation to support the work of the CCAD team."

— Dr. Emmanouil Brilakis, Chairman, Center for Coronary Artery Disease



Center for Coronary Artery Disease CCAD) team, including past international scholars. The CCAD center focuses on research for the treatment of chronic total occlusions (CTOs).

The Center for Coronary Artery Disease has built its expertise with a high volume of patients and proven success with a variety of innovative treatment strategies. The fellow will spend half of their time caring for patients at MHI® and the other half conducting research on CTOs and other coronary interventions for complex, higher-risk patient cases. As there are currently very few interventional cardiologists trained in treating complex coronary artery disease, the new fellowship will provide a unique opportunity to gain direct patient experience in clinical practice, and conduct cutting-edge research.

You Can Help Provide Great Patient Services in Research

At MHIF, quality patient support is at the heart of our culture. To better meet the needs of a rapidly growing patient population and significantly increased research, MHIF is planning to launch a new Patient Services Program. With funding, MHIF will be able to enroll more patients in research studies and positively impact their lives.

The Patient Services Program will employ a high-touch experience to:

- Provide patients with cutting-edge treatment options through research participation.
- Advance the rapidly increasing number of research projects at MHIF through enrollment of patients.
- Provide the highest level of personalized support to patients and their families throughout their research journey.
- Assist patients with tasks such as insurance pre-authorizations when needed for clinical trials.

You can make a difference in the lives of patients with heart and vascular disease through your generous support. MHIF will launch this new program as soon as it is philanthropically supported for three or more years.

Generous Gift Funds New Mobile Applications for Valve and Coronary Artery Procedures

The Joseph F. and Mary M. Fleischhacker Family Foundation has provided leadership funding to the development of a digital resource application platform that will allow other cardiologists around the world to freely access technical procedures for valve and coronary artery disease patients. MHIF teams are completing three algorithm-based procedures that provide detailed guides of best practices in valve-in-valve replacement procedures and complex artery blockage interventions.

Since prosthetic valve replacement has been available to patients for several decides, we now see patients who need to have those devices replaced for a variety of reasons. In this area, as in others at the Valve science Center, the goal is to be able to perform these surgeries without an additional open heart surgery, when possible. MHIF is creating a mobile device application to bring the best practices of placing a new prosthetic valve inside an original prosthetic valve with the highest level of success possible.

Originally developed by Dr. Vinayak "Vinnie" Bapat, cardiothoracic surgeon and researcher in MHIF's Valve Science Center, the Valve-in-Valve app can be downloaded on a mobile device and used by physicians around the world to determine appropriate size and characteristics of place a second valve inside of an existing prosthetic valve. Physicians access data and clinical insights to determine the technology options based on their individual patient needs, including guidance and insights on the implant procedure.

The generous gift is supporting the work of Dr. Bapat and Dr. Paul Sorajja in the Valve Science Center to build on two applications supporting Valve-in-Valve (VIV) Mitral and Patient Prosthesis Mismatch (PPM). The PPM application is new and focuses on clinical insights related to the use of a replacement valve incorrectly matched with the size and placement of the patient's anatomy, as well as research to prevent the occurrence of this complication.

Dr. Emmanouil Brilakis, in the Center for Coronary Artery Disease, is developing an application for a technically advanced procedure called chronic total occlusion–percutaneous coronary intervention (CTO-PCI), based on the growing database of patient cases and outcomes called Progress CTO. The research offers clinical insights and outcomes to consider in managing complex cases where arteries are completely blocked and standard catheter-based techniques may not be effective, or when open-heart surgery is considered too risky.

Physicians from the MHIF Valve Science Center team: Dr. Richard Bae, Dr. João Cavalcante, Dr. Paul Sorajja and Dr. Vinnie Bapat.

The Fleischhacker Family has been a valued partner and supporter of MHIF's work for many years. The Minnesota-based business the family founded in the early 1950s, Lake Region Medical, became the first supplier of pacemaker leads to Medtronic in 1960 when founder Earl Bakken was running the business out of his garage. At the time Lake Region Medical was sold in 2014, they were Medtronic's oldest continuous supplier.

MHIF Research Activities Poised to Expand Following United Heart and Vascular Clinic Merger with Minneapolis Heart Institute®

Following a mid-2020 merger with United Hospital's cardiology group, the Minneapolis Heart Institute® (MHI®) practice has grown significantly. In 2020, 70 MHI® cardiologists saw more than 61,000 individual patients at more than 114,000 clinic visits at Abbott Northwestern Hospital and outreach sites throughout the state. We are confident that rapid patient growth, combined with MHIF's strength in attracting leading research cardiologists in many areas, makes MHIF poised to lead to a robust increase in research studies and patient participation.

Minneapolis Heart Institute®

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