The mission of The Thoracic Surgery Foundation (TSF) is to foster the development of surgeon-scientists in cardiothoracic surgery, increasing knowledge and innovation to benefit patient care.

The Foundation is the charitable arm of The Society of Thoracic Surgeons.

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MESSAGE FROM THE PRESIDENT

Dear Colleagues, Patients, and Friends:

It has been my true privilege to serve as President of The Thoracic Surgery Foundation (TSF) for the past 3 years. Despite the economic and societal disruptions caused by COVID, the work of our Foundation has flourished. In 2021, TSF raised a record-breaking $3.3 million with total net assets peaking at $7+ million.

The Foundation received 190 award applications from surgeons last year, demonstrating the ongoing and urgent need for research and educational grant offerings. To meet this demand, TSF issued $660,000 in research awards. Our research funding has steadily increased, and we are determined to build on this upward trajectory. Research, education, leadership, and surgical outreach awards totaled $995,270 for the year.

I would like to thank every donor for stepping up to the plate for TSF in 2021. Surgeon donations hit an all-time high, topping almost $520,000! Of that amount, $332,574 was matched by The Society of Thoracic Surgeons (STS) via the TSF/STS Surgeon Match Challenge, with an additional $33,000 matched to expand the Saha Scholarship. Thank you for helping us maximize STS matching funds during such incredibly challenging times.

Since the Foundation’s inception, we have raised approximately $23 million for cardiothoracic surgery initiatives. Because of generous donors like you, funds have supported:

- 286 cardiothoracic surgery research and fellowship grants
- 63 surgical outreach awards and scholarships
- 128 travel scholarships to attend educational meetings
- 304 Alley-Sheridan scholarships

All of TSF’s administrative costs are covered by the Society and corporate grants, so that 100% of every dollar raised from you is directed toward award funding.

TSF is truly Your Foundation. TSF research grants, fellowships, and educational scholarships represent all our subspecialties and surgeons at every career stage. The Foundation’s awards have been instrumental in developing hundreds of young surgeons and have been key to incubating innovation across all of cardiothoracic surgery.

Read recipient testimonials about the impact of our awards in this Annual Report. They show the lasting footprint that TSF is leaving within our profession—an accomplishment we never could have achieved without your sustained support.

Thank you for your ongoing contributions to TSF.

Joseph E. Bavaria, MD, FRCS(Ed)
2019-2022 TSF President

3 thoracicsurgeryfoundation.org/donate
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100% of TSF Board Members Support the Foundation Annually

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Research Awards

TSF Research Award
This award provides operational support for original research efforts by cardiothoracic surgeons who have completed their formal training and who are seeking initial support and recognition for a research program. Awards of up to $40,000 per year for a maximum of 2 years are granted to support the work of early career cardiothoracic surgeons (within 7 years of first faculty appointment at the time of application deadline).

STS Research Award
This award provides operational support for original research efforts by cardiothoracic surgeons who have completed their formal training and who are seeking initial support and recognition for a research program. Awards of up to $40,000 per year for a maximum of 2 years are granted to support the work of early career cardiothoracic surgeons (within 7 years of first faculty appointment at the time of application deadline). The STS Research Award designation is given to the highest-ranking research application awarded by TSF based on merit as judged by a rigorous peer-review process.

Nina Starr Braunwald Research Fellowship Award
This award provides support up to $30,000 per year for a maximum of 2 years for a woman resident working in a cardiac surgical clinic or laboratory research program who has not yet completed cardiothoracic surgical training.

STSA Resident Research Award
This award provides up to $30,000 per year for a maximum of 2 years to support a research fellowship for a resident who has not yet completed cardiothoracic surgical training. During the fellowship, the resident will work in a cardiothoracic surgical clinical or laboratory research program. Membership in the Southern Thoracic Surgical Association (STSA) is not required; however, applicants must meet STSA membership eligibility requirements.

TSF Resident Research Fellowship Award
This award provides up to $30,000 per year for a maximum of 2 years to support a research fellowship for a resident who has not yet completed cardiothoracic surgical training. During the fellowship, the resident will work in a cardiothoracic surgical clinical or laboratory research program.

Award amounts increasing in 2022 and 2023
**Education Awards**

**Carolyn E. Reed Traveling Fellowship Award**
Carolyn E. Reed, MD, was a cardiothoracic surgeon, educator, and successful researcher who died while still in her prime. She served as the first female chair of The American Board of Thoracic Surgery (ABTS) and also was president of STSA and STS (posthumously). This award in her name provides support of up to $10,000 for a clinically established female cardiothoracic surgeon or resident in her last year of cardiothoracic surgery residency to travel to another institution for the purpose of learning a new skill or technology.

**Michael J. Davidson Structural Heart Fellowship Award**
Michael J. Davidson, MD, was an outstanding cardiothoracic surgeon and teacher who was murdered in January 2015 at Brigham and Women's Hospital in Boston. The tragedy profoundly affected the cardiothoracic community and brought to light Dr. Davidson’s achievements in mastering sophisticated catheter skills and advocating for a future that would meld the cardiac catheterization lab with the operating theater. This award in his name provides annual support of $50,000 for a deserving young early career cardiothoracic surgeon (within 7 years of first faculty appointment at the time of application deadline), and cardiothoracic surgery residents (in their last year of training at an ACGME-accredited program) committed to the vision of innovative and collaborative cardiovascular care that Dr. Davidson helped pioneer.

**Robert L. Replogle Traveling Fellowship Award**
Robert L. Replogle, MD, was a talented pediatric cardiac surgeon, as well as an educator, researcher, and national leader in cardiothoracic surgery. The purpose of the Replogle Fellowship is to facilitate the continuing education of deserving young faculty surgeons or residents committed to the treatment of congenital heart disease in neonates, infants, children, and adults. The award is intended for travel to another institution for the purpose of learning a novel technique, adapting innovative technology, and/or fostering collaboration among surgical investigators in order to further the progress of congenital heart surgery at the recipient’s home institution. This award provides support of up to $10,000 for maximum of 4 weeks for early career congenital heart surgeons who are within 7 years of ACGME-accredited congenital heart surgery fellowship completion (or its equivalent).

**Saha Scholarship**
This scholarship provides the opportunity for two cardiothoracic surgery residents, one from India and one from North America (United States or Canada), to attend the STS Annual Meeting. This award is made possible by the generosity of Sibu P. Saha, MD, MBA.

**Levi Watkins Innovation and Leadership Development Scholarship**
Levi Watkins, MD, an accomplished cardiothoracic surgeon and social activist at The Johns Hopkins Medical Center, made medical history by working with innovative physicians and engineers to implant the first automated internal cardiac defibrillator in a human being. The Watkins Scholarship supports travel to a center of excellence for the purposes of acquiring clinical, translational, or leadership training to enhance skills and practice in an area of innovation or surgical significance. This award provides support of up to $5,000 for a maximum of 2 weeks for cardiothoracic surgeons within 10 years of their first faculty appointment (at the time of the application deadline).

**Sarns Terumo Perfusion Education Fellowship Award**
The purpose of this award is to facilitate the continuing education of a deserving board-certified perfusionist who is committed to expanding cardiovascular perfusion education and knowledge. The $10,000 award supports travel to another institution for the purpose of learning unique techniques, simulation approaches, and innovative technology to improve care for cardiothoracic surgery patients at the recipient's home institution. This fellowship is supported by the generosity of Terumo Medical Corporation and Rich and Norma Sarns.
Leadership Awards

Alley-Sheridan Scholarships
Ralph D. Alley, MD, was a Founder Member of STS and served as its 1975–1976 President. David Sheridan, an inventor and close friend of Dr. Alley, held more than 50 patents for innovations that have improved health care. Moved by his friend’s commitment to cardiothoracic surgery, Sheridan created the Alley-Sheridan Fund, which provides scholarships of $2,500 toward the cost of tuition to attend the Leadership Program for Health Policy and Management at the Heller School for Social Policy and Management at Brandeis University in Massachusetts.

Surgical Outreach Awards

TSF Every Heartbeat Matters Awards
The Foundation, through the generosity and philanthropy of the Edwards Lifesciences Foundation, offers support of up to $37,500 for qualified surgeons with proven track records of volunteer experience conducting humanitarian outreach in underserved regions. Awards are designed to provide support for sustainable programs that educate, screen, and/or treat underserved populations to reduce the global burden of heart valve disease or support other programs that advance health care in vulnerable communities.

TSF International Medical Volunteer Scholarships
The generosity and philanthropy of the Edwards Lifesciences Foundation, provides travel scholarships of $2,500 each for qualified cardiothoracic surgery residents and early career cardiothoracic surgeons (within 7 years of CT surgery residency completion) who wish to gain a global cardiothoracic surgery volunteer experience under the mentorship of experienced surgeon volunteers. TSF International Medical Volunteer Scholars have the opportunity to join a TSF Every Heartbeat Matters Award humanitarian outreach team.

TSF Travel Scholarships*
These scholarships of $1,000 each provide cardiothoracic surgeons who treat underserved patients and demonstrate a financial need with the opportunity to attend the STS/EACTS Latin America Cardiovascular Surgery Conference. These scholarships have historically been made possible by the Edwards Lifesciences Foundation and W.L. Gore & Associates.

*Canceled in 2021 due to COVID-19

Medical team supported by TSF outreach scholarship in Bomet, Kenya
A message from the Research Chair

TSF Research Awards support the development of academic and research careers of the future leaders in cardiothoracic surgery. These awards identify, promote, and fund talented young cardiothoracic surgeons and residents working to create the future of our specialty through research and innovation.

This year, the Foundation funded $660,000 in research awards supporting projects in topics as diverse as designing 3-D perfusable scaffolds seeded with stem cells for ischemic heart failure, testing novel mucoadhesive polymers for nanoparticle-directed drug delivery in esophageal squamous cell carcinoma, investigating the role of glycation mechanisms on structural valve degeneration of transcatheter aortic valves, and investigation of pain and opioid use in thoracic postoperative recovery. These and other innovative projects funded by TSF will have a profound impact in our specialty and improve the care of our patients.

Grants from TSF are funded through contributions by hundreds of cardiothoracic surgeons, STS, and several corporations. Their philanthropy and generosity allow these outstanding researchers to implement their ideas and further their careers. TSF funding has provided the initial support that has later allowed multiple cardiothoracic surgeons to attract larger grants from the National Institutes of Health (NIH), National Science Foundation, and other agencies.

I’d like to recognize the selfless efforts and dedication of the TSF Research Committee. Members spent innumerable hours reviewing, scoring, and discussing the 2021 Research Award applications, which will help promote cardiothoracic surgery research, accelerate the careers of our future leaders, and—most importantly—enhance the care of our patients.

I’d also like to congratulate the 2021 TSF Research Award recipients, who are acknowledged in this report, and express my most profound gratitude to the donors, and TSF as a whole, for the privilege and honor to serve as Chair.

Elaine E. Tseng, MD
2021 TSF Research Chair

Gorav Ailawadi, MD, MBA
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David D. Odell, MD
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Toshiharu Shinoka, MD, PhD
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Ram Kumar Subramanyan, MD
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Luis Tapias, MD
Patricia A. Thistlethwaite, MD, PhD
Frederick A. Tibayan, MD
Robert F. Tranbaugh, MD
Elaine E. Tseng, MD (Chair)
Harma K. Turbendian, MD
Prashanth Vallabhaprassam, MD
(Rice Chair)
Abby White, MD
Bryan A. Whitson, MD, PhD
Berhane Worku, MD
Bo Yang, MD, PhD
Sai S. Yendamuri, MD
Joseph B. Zwischenberger, MD
“I am extraordinarily honored to be selected for the TSF Resident Research Fellowship Award and grateful to the department of CT surgery at UCSF and my mentor, Dr. David Jablons, without whom my research would not be possible. This award provides me the opportunity to study the role of PARP inhibitors on esophageal squamous cell carcinoma and work to improve the outcomes of patients who suffer from this disease.”

Nathan R. Brand, MD, MSc
University of California San Francisco
“The Effect Of PARP Inhibition On Esophageal Squamous Cell Carcinoma: An Opportunity For A Novel Therapeutic”

TSF Resident Research Fellowship Award, $60,000

“The TSF Resident Research Award will support my work in Dr. Bharat’s laboratory at Northwestern University where I will be studying the role of nonclassical monocytes and lung-restricted antibodies in the development of primary graft dysfunction in lung transplant recipients, with a special focus on cystic fibrosis patients. My hope is this work will uncover interventions for both the prevention and treatment of primary graft dysfunction.”

Emily J. Cerier, MD
Northwestern University, Chicago, IL
“Recipient Non-Classical Monocytes Drive Primary Graft Dysfunction in Cystic Fibrosis Recipients”

TSF Resident Research Fellowship Award, $60,000
“This award will be instrumental in supporting research into the role of tumor-derived extracellular vesicles in the development of lymph node metastasis in patients with gastroesophageal malignancies. Given that this work is being carried out in my nascent laboratory, I cannot stress the extent to which this support is critical to my ongoing research. Being a part of the scientific community dedicated to improving outcomes in this malignancy is central to my career.”

Jonathan Cools-Lartigue, MD, PhD
McGill University, Montréal, QC, Canada

“Investigating the Role of Tumor-Derived Extracellular Vesicles in Polarizing Polymorphonuclear Granulocytes Towards a Pro-Metastatic Phenotype”

TSF Research Award, $80,000

“I am deeply grateful for the award of the TSF Resident Research Fellowship, supporting my post-doctoral work in the laboratory of Dr. Pavan Atluri. The fellowship will not only support my studies investigating metabolic derangements in acute non-ischemic cardiomyopathies, but also provide important education in transitioning towards becoming a young investigator.”

Amit Iyengar, MD, MSE
University of Pennsylvania, Philadelphia, PA

“Understanding the Metabolic Changes Occurring from Stress Cardiomyopathy”

TSF Resident Research Fellowship Award, $60,000

“I am grateful and humbled to receive the STS Research Award, which will be used by our lab to investigate the role of a tumor immune microenvironment in promoting therapeutic resistance in esophageal cancer. This funding will be essential to generate the data we need to uncover the mechanisms by which esophageal cancer evades the immune system.”

Kiran H. Lagisetty, MD
University of Michigan, Ann Arbor

“Determining the Role of GRAIL (RNF128) Isoform Changes on Resistance to Chemotherapy in Neoadjuvant Therapy for Esophageal Adenocarcinoma”

STS Research Award, $80,000
RESEARCH AWARD RECIPIENTS (CONTINUED)

“I am grateful for this award and the opportunities it presents. It allows me to further cardiovascular education and practice in low-resource settings. Additionally, it represents a commitment of the Foundation and its members to underserved and vulnerable populations. Dr. Nina Braunwald was a true pioneer, and I hope that we can continue to honor the incredible contributions she has made to our field and beyond.”

Yihan Lin, MD, MPH
University of Colorado, Denver

“Global Cardiovascular E-Learning: Transcending Borders During COVID-19 and Beyond”

*Nina Starr Braunwald Research Fellowship Award, $60,000*

“This award will support my work in Dr. Mentzer’s lab at Brigham and Women’s Hospital, where we will be investigating accelerating wound healing of mesothelial injuries via a bio-derived interface. I am so excited to start and appreciate the opportunities this award will provide!”

Betty S. Liu, MD
Brigham and Women's Hospital, Boston, MA

“Accelerating Wound Healing of Mesothelial Injuries Using a Bio-Derived Interface with the Heart and Lungs”

*TSF Resident Research Fellowship Award, $60,000*

“Receiving this award is a true testament to the dedication and hard work of our entire laboratory, and I am humbled and excited to represent our team. We will investigate the application of in-vivo lung perfusion and its rehabilitative potential to a novel model of ARDS, continuing the work championed by many who came before me.”

Evan P. Rotar, MD, MS
University of Virginia, Charlottesville

“Evaluation of the Rehabilitative Advantage of IVLP in ARDS Using a Porcine Gastric Aspiration-Induced Lung Injury Model”

*Southern Thoracic Surgical Association (STSA) Resident Research Award, $30,000*
RESEARCH AWARD RECIPIENTS
(CONTINUED)

“This generous Research Award from TSF will fund my work studying stress response pathways in the normal and diseased esophagus. As an organization representing the mission and generosity of our field, the Foundation’s support of my early career is immensely meaningful, as we work towards the ultimate goal of improving treatment for patients with esophageal cancers.”

Uma M. Sachdeva, MD, PhD
Massachusetts General Hospital, Boston

“Esophageal Epithelial Stress Response Pathways and Metabolic Shifts Associated with Carcinogenesis in the Progression from Barrett’s Esophagus to Adenocarcinoma Using 3D Organoids”

TSF Research Award, $80,000

“By providing a combination of training in an immersive clinical research experience and formal mentorship from renowned pediatric cardiac surgeons, this fellowship will allow me to lay the foundations for a future career as a congenital surgeon-scientist. I remain forever grateful to the TSF and my mentors for this opportunity.”

Aditya Sengupta, MD
Boston Children’s Hospital, Massachusetts

“Assessment of Long-Term Neurodevelopmental Outcomes in Congenital Heart Disease after Cardiac Surgery in Infancy and Childhood”

TSF Resident Research Fellowship Award, $60,000

2021 AWARDS DISPERSED BY TYPE
TOTAL $995,270

- Research $660,000
- Surgical Outreach (Underserved Regions) $182,500
- Education $137,770
- Leadership $15,000

WHY I GIVE

“I am certain that what I contribute to TSF truly makes a difference in our specialty. I have always wanted to support the research and educational missions of our specialty, and by supporting the TSF, I am confident that my gifts will be directed to the areas that I am passionate about. This confidence comes from the fact that the Foundation is guided by surgeons who have the best interests of our specialty in mind.”

Anthony L. Estrera, MD
“It is a unique privilege to be able to undertake this Fellowship at Brigham and Women’s Hospital, Harvard Medical School, Boston, where Dr. Davidson served on faculty. This fellowship will provide the comprehensive training required to begin a practice as a structural heart disease specialist and the ideal platform on which to build a career in academic cardiac surgery.”

William Y. Shi, MD
Massachusetts General Hospital, Boston

Structural and Endovascular Cardiac Surgery Fellowship
Structural Heart Fellowship Award, $50,000

“As the field of cardiac surgery continues to evolve and the patient population of those with structural heart disease continues to grow and age, I believe that training as a ‘hybrid surgeon’ to offer the full spectrum of treatment options for each disease process will become the new training paradigm. This fellowship will allow me to train in the full spectrum of treatment options for structural heart disease and offer the best treatment for these patients.”

Qasim Al Abri, MD
Houston Methodist Hospital, Texas

Minimally Invasive and Structural Heart Fellowship
Structural Heart Fellowship Award, $50,000

“I am grateful and honored to receive the Carolyn E. Reed Traveling Fellowship Award. My goal is to use this experience and my interests in immunology, oncology, and transplantation to grow the Organ Perfusion Laboratory at the University of Chicago into a hub that performs cutting-edge translational research and serves as a training ground for future surgeon-scientists.”

Maria Lucia L. Madariaga, MD
University of Chicago, Illinois

“Building Skills To Establish a Translational Organ Perfusion Laboratory at the University of Chicago”

Carolyn E. Reed Traveling Fellowship Award, $4,470
“This is an incredible honor and opportunity to learn a new surgical technique and to bridge my interests in robotic surgery and first rib resections for thoracic outlet syndrome. I hope to honor the career and memory of Dr. Reed by constantly seeking innovation and excellence in my career and craft.”

Samine Ravanbakhsh, MD
Mayo Clinic Arizona, Phoenix

“Bringing Robotic First Rib Resections to Arizona”

Carolyn E. Reed Traveling Fellowship Award, $3,000

“I am honored to have received the Carolyn E. Reed Traveling Fellowship Award, which will support my surgical training in hypertrophic cardiomyopathy (HCM) surgery. My aim is to improve and develop my septal myectomy technique and to learn how a high volume HCM center manages these complex patients, so that I can apply those same principles to the HCM center that I have developed at Augusta University for the patients in this region.”

Alison F. Ward, MD
Augusta University Health, Atlanta, GA

“Surgical Management of Hypertrophic Cardiomyopathy”

Carolyn E. Reed Traveling Fellowship Award, $3,000

“Although effective valve replacement options exist in adults, they are far from optimal for children and young adults. The opportunity to repair a child’s valve in a durable fashion that offers the potential of somatic growth is particularly special. My personal goal is to learn advanced aortic valve repair techniques, in addition to the Ross procedure, to help me provide the full suite of tailored surgical treatments for pediatric semilunar valve disease.”

Andrew B. Goldstone, MD, PhD
Children’s Hospital of Philadelphia, Pennsylvania

“Advanced Training in the Ross Procedure and Aortic Valve Repair Techniques”

Robert L. Replogle Traveling Fellowship Award, $10,000

“I am deeply honored to receive the Sarns Terumo Perfusion Education Fellowship Award, which will support my simulation education with David Fitzgerald at the Medical University of South Carolina. My goal is to use this experience to grow the simulation lab at the University of Michigan into a world-renowned training ground for the cardiovascular surgical team by expanding my skills as an educator through research, education, and implementation of best practices.”

Gregory M. MacLean, BS, CCP
University of Michigan, Ann Arbor

“Multidisciplinary High-Fidelity Simulation Training to Improve Collaboration During Emergent Cardiac Procedures at The University of Michigan”

Sarns Terumo Perfusion Education Fellowship Award, $10,000

“Since the beginning of fellowship, it has been stressed that the goal of training is to develop into a surgeon who makes an impact in the operating room, the boardroom, and the community. I will utilize these award funds to learn minimally invasive surgical approaches to treating atrial fibrillation and inappropriate sinus tachycardia. And I am certain this experience will move me closer to the surgeon I aspire to be.”

David J. Spurlock, MD
Spectrum Health, Grand Rapids, MI

“Atrial Fibrillation Techniques”

The Levi Watkins Innovation and Leadership Development Scholarship, $3,200
**2021 SURGICAL OUTREACH AWARD RECIPIENTS**

- **Michael T. Cain, MD**  
  University of Colorado Denver  
  Underserved Region: Kenya/Tenwek Hospital  
  *International Medical Volunteer Scholarship Award, $2,500*

- **Emily A. Farkas, MD**  
  Indiana University School of Medicine, Indianapolis  
  Underserved Region: Kenya  
  *TSF Every Heartbeat Matters Award, $35,000*

- **Reza Khodaverdian, MD**  
  Heart and Lung Surgical Specialties, Rancho Mirage, CA  
  Underserved Region: Nigeria  
  *TSF Every Heartbeat Matters Award, $35,000*

- **Ayodele Osasona, MD**  
  Ochsner, New Orleans, LA  
  Underserved Region: Kenya  
  *International Medical Volunteer Scholarship Award, $2,500*

- **Jeffrey D. McNeil, MD**  
  Cardiothoracic and Vascular Surgeons, Austin, TX  
  Underserved Region: Nigeria  
  *TSF Every Heartbeat Matters Award, $35,000*

- **Mubashir A. Mumtaz, MD**  
  University of Pittsburgh Medical Center Pinnacle, Harrisburg, PA  
  Underserved Region: Pakistan  
  *TSF Every Heartbeat Matters Award, $35,000*

- **Shakirat O. Oyetunji, MD, MPH**  
  University of Washington, Seattle  
  Underserved Region: Nigeria  
  *International Medical Volunteer Scholarship Award, $2,500*

- **Thomas Theologou, MD**  
  Cardiocentro Lugano, Switzerland  
  Underserved Region: Vietnam  
  *TSF Every Heartbeat Matters Award, $35,000*

**YOUR FUNDS AT WORK**

“I am so thankful for the Carolyn E. Reed Traveling Fellowship Award and the opportunity it provided me to further develop my surgical skills, seek out mentorship, and grow as a surgeon. I spent 2 weeks with Dr. Joseph Dearani and Dr. Hartzell Schaff at the Mayo Clinic in Rochester, Minnesota, for intensive training in septal myectomy surgery. Seeing 10 myectomies over 2 weeks was a truly unique experience that allowed me to understand each facet of the operation from patient positioning to the specialized instruments and surgical techniques used. I am excited to bring to Emory all the techniques and knowledge I gained with the goal of further developing our hypertrophic cardiomyopathy center into a regional high-volume center.”

**Alison F. Ward, MD**  
Augusta University Health

“Surgical Management of Hypertrophic Cardiomyopathy”

*Carolyn E. Reed Traveling Fellowship Award, $3,000*
BRAUNWALD AWARD ENABLES IN UTERO RESEARCH INTO CONGENITAL HEART DISEASE

STS News, Fall 2021

For women entering a career in cardiothoracic surgery, the Nina Starr Braunwald Research Award offers a prestigious opportunity to bring original research to the table. Mallory Hunt, MD, MBE, an integrated cardiac surgery resident at the University of Pennsylvania in Philadelphia, used her award to explore complications associated with congenital heart disease before patients leave the womb.

“Children who have congenital heart disease are living longer because we're getting better at operating on them,” said Dr. Hunt. “Now we’re observing that they have neurological and neurodevelopmental sequelae later in life, meaning that they tend to lag behind their peers in areas such as educational achievement, employability, and functional status.”

For years, the medical community speculated that these sequelae were a consequence of surgical interventions in the first few days of life, Dr. Hunt explained. But now there’s evidence that complications may begin as early as the fetal stages. By studying the effects of placental insufficiency and in utero hypoxia, Dr. Hunt’s team sought to better understand the conditions that may lead to heart defects and developmental complications.

Obviously, recreating these conditions would be problematic in human fetuses. But while Dr. Hunt was studying under J. William Gaynor, MD, at Children's Hospital of Pennsylvania in Philadelphia, she was introduced to a model akin to an artificial womb. Developed originally as a means of supporting babies
who were born extremely premature, this womb model provided Dr. Hunt's team with a tool to simulate in utero oxygen delivery in developing sheep.

“We were able to deliver fetal sheep at what would roughly be sort of a second-trimester gestation equivalent to that of a human,” Dr. Hunt said. “We placed a group of sheep in this womb environment in conditions that were relatively hypoxic, as well as a group in an environment more representative of that of a normal fetus without congenital heart disease.”

Initially, the researchers focused especially on observing neurodevelopmental status in the fetuses. “Over time, though, the project really evolved and took on a life of its own, because we realized that we were able to study basically every organ system within the body,” said Dr. Hunt. “Through collaborations with researchers in different schools at the university, we now have people who are looking at all major organ systems, and I think that’ll tell us a lot—not just about average developmental habits in children who have congenital heart defects, but also how development is altered in children who are hypoxic in utero for other reasons.”

Prior to this project, Dr. Hunt's research had been mainly clinical in nature, focusing on outcomes for children who had undergone heart surgery for congenital defects. “But not necessarily anything that involved bench research or translational research,” she said. “At a certain point I was thinking about what I wanted my career to involve from the research arm, and I realized that there was this great opportunity to pursue projects that addressed the problems we saw in the clinic from a more basic science point of view. And then see those projects from inception to hopefully implementation into clinical practice.”

Dr. Hunt says that the financial support of the Braunwald award was critical to bringing her project to life. “Women are underrepresented in our field, and dedicated research awards targeted at female trainees is such a great opportunity for us. It helps us establish ourselves in a way that’s unique and that highlights what we’re able to do. It really has helped propel my career over the last few years, not just in terms of funding but also in terms of the connections I’ve been able to make with people interested in my research.”
### MAJOR GIFTS DONOR HONOR ROLL

TSF is grateful for its most generous donors who have given $10,000 or more cumulatively.

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$4,000,000+
- The Society of Thoracic Surgeons (STS)

#### SILVER

$2,000,000+
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- Foundation for Advancement of Cardiac Therapies, Inc.
- The Chantal and Tommy Shanda H. Blackmon, MD, MPH*
- AstraZeneca
- American College of Surgeons (ACS)
- American College of Cardiology

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*Individual helped facilitate a donation from a third party

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- University of Pennsylvania - Division of Cardiovascular Surgery
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- James L. Zeliner, MD

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#### TOTAL NET ASSETS

2017: $3,402,685
2018: $3,506,740
2019: $4,335,118
2020: $4,869,415
2021: $7,175,947

(continued on next page)
“My 2019-2021 TSF award has been instrumental to my research career. Through the funds provided, I was able to assemble a study team and conduct a prospective trial on a digital health intervention which automated monitoring of patient-reported outcomes in thoracic surgery patients at the University of North Carolina. This work demonstrated the feasibility of the intervention in a public hospital setting as well as areas for improvement, which are the focus of my recently funded NHLBI mentored patient-oriented research career development award (K23). I am extremely grateful for the support of TSF, which allowed me as a junior investigator to get this work off the ground and secure my own funding.”

Gita N. Mody, MD, MPH
University of North Carolina

“Improving Lung Cancer Surgery Using Patient-Centered Outcomes”

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TOTAL REVENUE 2017 - 2021

2017 | 2018 | 2019 | 2020 | 2021
$2,165,128 | $2,664,804 | $1,979,227 | $1,631,926 | $3,257,923

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