

### PROGRAM HISTORY

The Vascular Surgery Scientist Training Program (VSSTP) at Northwestern University was created in 2009 by William H. Pearce, MD, Emeritus Professor of Surgery, with the objective of increasing the number of vascular surgeon-scientists in the United States. Since its inception, we have accepted two trainees per year for the two year training experience. Among the many successful graduates, trainees have completed a Master's program, obtained additional extramural funding, including the American Heart Association Greater Midwest Affiliate Postdoctoral Fellowship, the Society of University Surgeons-Ethicon Surgical Research Fellowship, the American Medical Association Seed Grant, and an NIH F32 NRSA grant along with multiple awards and special recognitions at regional, national, and international meetings. Most importantly, several have now completed their surgical training and have secured faculty appointments at nationally recognized academic institutions.

### BASIC OUTLINE OF PROGRAM

This two-year training program is designed for surgical residents in general surgery, vascular surgery, and/or cardiothoracic surgery with the goal of providing a seamless multidisciplinary environment in which the trainee may interact with a diverse group of distinguished research faculty. Trainees may select one of several tracks or a combination of tracks that meets their ultimate goals. The research tracks include (1) vascular biology with a basic science emphasis, (2) clinical outcomes research, (3) biomedical devices, or (4) an integrated program.

In this program of mentored research, the trainee will work daily in the primary mentor's lab or office on a specific project. The program is supplemented by specific coursework given in the evenings. This system allows for uninterrupted time to perform experiments, library research, data collection, and analysis. The trainee will have access to secondary mentors for additional technical expertise or advice. Thus, there is a synergistic process as mentors translate classroom teaching into real-life research projects. In addition, the trainees will be embedded in the mentors' laboratories and/or offices – learning along with other trainees, postdoctoral fellows, and research associates.

The curriculum is individualized to meet the needs of the trainee. The mentor and trainee will begin with a needs assessment as trainees from diverse backgrounds will have differing needs. Next, the trainee, mentor, and Program Directors (PD) will agree upon an Independent Development Program and create a Learning Contract. The curriculum will be agreed upon by the trainee, mentor, and PDs.

The trainee's goals and needs are discussed with the PDs and potential mentors before final selection of mentors. In addition, there is some flexibility to allow the trainee to choose mentors and courses from several tracks (Integrated Program). For example, a trainee may select to study hybrid stents (biologic coatings). In this case, vascular biologists and bioengineers will provide mentoring for the trainee and the trainee may take courses in molecular and cellular biology in conjunction with bioengineering courses and the newly added biodesign course.

Trainees who select the Clinical Outcomes Research track are encouraged to pursue the Masters in Health Services and Outcomes Research degree program at Northwestern. In this case, the MS program provides enough latitude to suit trainees interested in this track.

The strength of this program lies in its breadth, flexibility, and existing collaborations. Our goal is to match the research interest of the trainee to mentors, coursework, seminars, meetings, and a research plan that will collectively provide the experience necessary to launch a successful career as a scientist.

### CANDIDATES FOR TRAINING PROGRAM

Interested individuals must submit a written application along with three letters of recommendation. The candidates will be selected on the basis of their commitment for a two-year mentored experience in one of their areas of interest and their commitment to an academic career.

Candidates must hold either an MD degree or DO degree and have completed at least two years of clinical training prior to acceptance in the program. Candidates must be U.S. citizens or a noncitizen U.S. national or have been lawfully admitted for permanent residence at the time of appointment.

The ideal candidates will be recruited from general surgery, vascular surgery, or cardiac/thoracic surgery residency programs from across the country.

Women and underrepresented minorities in medicine are encouraged to apply.

### PROGRAM DIRECTION & KEY FACULTY

#### **Program Director**

**Mark K. Eskandari, MD**, The James S.T. Yao, Professor of Vascular Surgery, and Chief and Fellowship Program Director of the Division of Vascular Surgery, serves as the Program Director of this program. Dr. Eskandari has been the Chief of the Division of Vascular Surgery (since 2010) and Program Director for the Vascular Surgery Fellowship (since 2005) and became the co-PD of the VSSTP in 2016, and PD in 2018. He maintains a busy clinical academic vascular surgery practice combined with an extensive clinical research program that is funded by both corporate and NIH-sponsored grants. Recognized as a clinician-educator, Dr. Eskandari has been the recipient of six Excellence in Teaching Awards from the Department of Surgery at NU FSM and induction into the NU FSM Teaching Hall of Fame, as well as the Wylie Travelling Fellowship Award from the SVS, and a Clinical Innovation Award from NU FSM. Dr. Eskandari holds joint appointments in Radiology and Medical Education, attesting to his commitment to multidisciplinary collaboration at FSM. Dr. Eskandari's bibliography includes 190 peer-reviewed manuscripts and review articles, as well as 64 book chapters, with many co-authored by his numerous trainees. He has a longstanding track record of training and mentoring junior faculty, fellows, residents, and students during his 20 years of practice. Many of Dr. Eskandari's trainees have become successful academic vascular surgeons throughout the country.

#### **Associate Program Directors**

**Guillermo A. Ameer, ScD**, will serve as the Co-Associate Program Director for the VSSTP. Dr. Ameer holds joint appointments as the Daniel Hale Williams Professor in the Department of Biomedical Engineering, McCormick School of Engineering and the Department of Surgery, FSM at NU. Dr. Ameer is the Director of the Center for Advanced Regenerative Engineering and has collaborated with the Division of Vascular Surgery and the Department of Surgery for more than 15 years. He has received numerous awards including the National Kidney Foundation's Victor M. G. Chaltiel Young Investigator Award in 2002, the Arnold and Mabel Beckman Foundation Young Investigator Award in 2004, the American Immigration Law Foundation Immigrant Achievement Award in 2004, the Wallace H. Coulter Foundation Early Career Translational Research Award in 2005, the National Science Foundation CAREER Award in 2006, the American Heart Association's Established Investigator Award in 2006, and the American Institute of Chemical Engineers MAC Eminent Chemical Engineer Award in 2016. In addition, he is a member of the College of Fellows of the American Institute of Medical and Biological Engineering, Fellow of the Biomedical Engineering Society, Fellow of the American Institute of Chemical Engineers, Fellow of the American Association for the Advancement of Science, and member of the National Academy of Inventors. Dr. Ameer has over 100 peer-reviewed manuscripts and 55 patents issued and pending (35 issued). He works on several research projects including the regeneration of skin, heart, bladder, bone, blood vessels, and restoration of islet function. Regenerative biomaterials pioneered in his laboratory and Center are now used in orthopaedic medical devices that have been recently approved by the Food and Drug Administration.

**William A. Muller, MD, PhD**, will serve as a Co-Associate Program Director for the VSSTP. Dr. Muller, the Janardan K. Reddy, MD Professor of Pathology, has been a mentor since 2014. He is the immediate past chair of the Department of Pathology. He is PI on 2 R01 grants pertaining to the molecular and cellular dynamics and regulation of inflammation and has had an independently funded basic science lab for over 25 years. Dr. Muller has received multiple major awards, including election as an AAAS Fellow, the Rous Whipple Award from the American Society of Investigative Pathology, a MERIT Award and an Outstanding Investigator Award from NIH. He is a past president of the North American Vascular Biology Organization (NAVBO) and is currently serving as the Secretary/Treasurer. He is currently Vice-President of the American Society for Investigative Pathology, and is on the four-year Presidential succession chain. He also has an exceptionally strong track record of mentoring graduate students and postdoctoral fellows over the past 27 years, many of whom are now thought leaders in the field. Dr. Muller has also been the PI of a T32. He has authored or co-authored 147 peer-reviewed manuscripts. He also served on the advisory committee for Dr. Karen Ho, a vascular surgeon with a K08 award who is also a mentor for this grant.

### **Institutional Advisor**

**William H. Pearce, MD**, Emeritus Professor of Vascular Surgery, established the VSSTP at NU FSM in 2009 and will serve as an Institutional Advisor. Dr. Pearce is a nationally and internationally known vascular surgeon and immediate past chief of the Division of Vascular Surgery at NU FSM (1998-2010). He is a dedicated educator who served as program director of Northwestern's Vascular Surgery Fellowship from 1994 to 2005. He is a past president of the American Association of Vascular Surgery (AAVS, 2001-2002) and a past chairman of the American Vascular Association (AVA, 2004-2010), the charitable arm of the SVS that raised funding for the supplementation to vascular surgeon K08/K23 awards. Dr. Pearce has an extensive history of mentoring vascular trainees and junior faculty, resulting in eight teaching awards and induction into the FSM Teaching Hall of Fame, recognition by the American Heart Association's Council on Cardiovascular Surgery and Anesthesia as "Surgeon Mentor of the Year", by Northwestern Memorial Hospital with the first Gary A. Mecklenburg Distinguished Physician award, and by NU FSM as Mentor of the Year in 2008 and 2011. Dr. Pearce has been actively involved in basic science research, studying the pathogenesis of abdominal aortic aneurysms. He has longstanding collaborations with many of the investigators participating in this T32 grant as demonstrated in his many joint publications. He has served on a number of NIH study sections (SBE, SBIR, T32 Training Grants) as well as a Defense Medical Research and Development Program—Vascular Surgery Peer Review Panel. He has authored or co-authored 266 peer-reviewed publications, 122 book chapters, and 40 books.

### **PROGRAM FACULTY**

Mentors for the various fields of concentration have been recruited and represent senior, midlevel, and junior faculty. The program mentors represent a wide range of expertise in fields relating to vascular biology, medicine, epidemiology, bioengineering, and vascular surgery. They are all well-respected in their fields and have shown a commitment to serve as mentors for this program. Many of the mentors are currently collaborating on vascular-oriented projects and already have broken down many of the interdepartmental barriers. The faculty represent many of the important aspects of translational research.

### Vascular Biology:

- **Hasan B. Alam, MD**, is the Loyal and Edith Davis Professor and Chair of the Department of Surgery at Northwestern University Feinberg School of Medicine and Surgeon-in-Chief at Northwestern Memorial Hospital. Dr. Alam has established himself as an exceptional investigator, skilled clinician and thoughtful educator. His research interests are in the areas of novel resuscitation strategies, hemorrhage control, modulation of cell protective strategies, consequences of septic shock, and traumatic brain injury. He is currently involved in 11 clinical trials, several of which he is the principal investigator. In addition, his research is funded by large federal grants including the National Institutes of Health and the U.S. Department of Defense. Dr. Alam has over 304 manuscripts and books published of which include his original research. He has earned numerous awards for excellence in teaching and research and has been a mentor to over 40 medical students, residents, fellows, doctoral researchers, and faculty. He currently serves on the editorial boards of leading surgical trauma and critical care journals including the Journal of the American College of Surgeons, Journal of Trauma and Acute Care Surgery, International Journal of Surgery, Critical Care Medicine, and the Annals of Surgery.
- **Hossein Ardehali, MD, PhD**, Division of Cardiology, Department of Medicine. Dr. Ardehali is the Director of the Feinberg Center for Molecular Cardiology and Director of the MD/PhD program at Northwestern. His research interests include the role of mitochondria and metabolism in cardiovascular disease and cellular iron regulation. His laboratory focuses on understanding the mechanism of myocardial cell death in response to ischemic damage and in particular the mitochondrial protein called the mitochondrial ATP-binding cassette protein-1 (mABC1) as well as the serine/threonine kinase called Snf-1 related kinase (SNRK). Dr. Ardehali was the first to show that mABC1 is protective against oxidant induced cell death *in vitro*. He is PI on three NIH R01 awards. Dr. Ardehali was recently appointed director of the Northwestern Medical Scientist Training Program (MSTP) and is a Co-Principal Investigator of a National Heart, Lung, and Blood Institute (NHLBI) T32 training grant, entitled “Northwestern Molecular and Translational Cardiovascular Training Program.”
- **Karen J. Ho, MD**, is the John Marquardt Clinical Research Professor of Vascular Surgery, Director for Vascular Research in the Division of Vascular Surgery, and Director of Resident Research in the Department of Surgery. Dr. Ho completed a T32 research fellowship at Brigham and Women’s Hospital. Her research interests include the role of gut microbiota and microbe-derived metabolites on arterial remodeling after injury and peripheral arterial disease. Her laboratory has expertise in microbiome manipulations, models of arterial injury in germ-free and conventionally-raised mice, genetic and diet-induced models of atherosclerosis, targeted metabolomics, and cultivation-dependent and -independent approaches to studying gut microbiota. In recent studies, her lab demonstrated novel links between specific microbe-derived metabolites and disease severity and adverse cardiovascular events in patients with peripheral arterial disease. Her lab also reported that germ-free mice, which lack all microbiota, have attenuated arterial remodeling after vascular surgery, which is restored by fecal transplantation. Most recently, her lab demonstrated that the butyrate receptor free fatty acid receptor 3 (FFAR3) but not FFAR2 mediates the protective effects of butyrate on neointimal hyperplasia development. Her research

has been funded by the NIH, American College of Surgeons, Society of Vascular Surgery, and Vascular Cures. She has a strong commitment to mentorship and to fostering the development of physician-scientists and has been recognized with numerous teaching and mentoring awards.

- **Tsutomu Kume, PhD**, Division of Cardiology, Department of Medicine, and Department of Molecular Pharmacology and Biological Chemistry. Dr. Kume is Professor of Medicine (Cardiology) with a research focus on vascular formation and angiogenesis. In particular, he is interested in the analysis of neovascularization in physiological and pathological settings using mice as a model. Dr. Kume was the PI or co-PI on two recently concluded NIH-funded grants and currently is the PI on three. He has a track record of successful and productive research projects in the areas of vascular development and disease while serving as the primary mentor for several postdoctoral fellows.
- **Luisa Iruela-Arispe, PhD**, Professor and Chair of the Department of Cell and Developmental Biology at Northwestern University. Her research focuses on the signaling pathways that regulate morphogenesis and homeostasis of the vasculature. An effort that has mounted to nearly 200 peer-review publications. A major component of this work has centered on the multiple effects of VEGF and Notch signaling in blood vessels, including their key contributions to diseases such as Alagille and CADASIL. In addition, her research team has contributed to clarify the mechanisms associated with vascular regeneration and the impact of mechanobiology on vascular function, and have received continuous support from the NIH, and specific projects also received support from several foundations, DOD, and industry. Mentoring is a core component of her academic mission. Since 1994, Dr. Iruela-Arispe has mentored 20 graduate students and 23 postdoctoral fellows all who are currently employed in academia, publishing or in industry. In 2002, she created a graduate training in Vascular Biology, a program that has been supported continuously by an NIH T32 award, now in its fourth iteration. In her current role as Professor and Chair of the Cell and Developmental Biology Department at Northwestern University, she is expanding and fostering the growth of a vibrant, diverse and inclusive group of faculty and trainees to address fundamental questions in cell and developmental biology.
- **Elizabeth M. McNally, MD, PhD**, Division of Cardiology, Department of Medicine. Dr. McNally is Professor of Medicine (Cardiology) and Biochemistry and Molecular Genetics as well as the Elizabeth J. Ward Professor of Genetic Medicine and director of the Center for Genetic Medicine. Her laboratory studies genetic mechanisms responsible for inherited human diseases including heart failure, cardiomyopathy, muscular dystrophy, arrhythmias, and aortic aneurysms. By establishing models for these disorders, they can begin to develop and test new therapies, including genetic correction and gene editing. She is PI on multiple NIH funded awards. Dr. McNally has had more than 80 trainees and is the Program Director of the NHBLI T32 training grant, entitled “Northwestern Molecular and Translational Cardiovascular Training Program.” She is an outstanding mentor, providing both scientific and professional guidance to trainees.
- **William A. Muller, MD, PhD**, Department of Pathology. Dr. Muller is the Janardan K. Reddy, MD Professor of Pathology at NU and immediate past Chair of the Department of Pathology. For more than 30 years, his research has focused on describing how leukocytes cross blood vessels during inflammation. In particular, his laboratory focuses on the process of diapedesis, the “point of no

return” in inflammation where leukocytes squeeze between tightly apposed endothelial cells to enter the site of inflammation. His laboratory has identified and cloned several molecules that are critical to the process of diapedesis, including PECAM (CD31), CD99, and VE-cadherin, and they are studying how these molecules regulate the inflammatory response using in vitro and in vivo models. Among his many achievements, Dr. Muller was awarded the Rous-Whipple Award in 2013, the American Society for Investigative Pathology’s most prestigious honor, was elected as a Fellow of the AAAS, and received the NIH MERIT (Method to Extend Research in Time) Award from the NHLBI. Most recently, he received an Outstanding Investigator Award from the NHLBI.

- **Satish N. Nadig, MD, PhD** is the Edward G. Elcock Professor of Surgery, Chief of the Division of Transplantation, and Director of the Comprehensive Transplant Center at Northwestern University, Feinberg School of Medicine. He is an adult and pediatric multiorgan transplant surgeon and Professor in the Departments of Surgery, Microbiology/Immunology, and Pediatrics. He directs the NIH-funded Comprehensive Transplant Immunobiology Laboratory and holds a Doctor of Philosophy in immunology from Oxford University. He has served as a national and international visiting professor and has been identified as a “Key Opinion Leader” in the Transplantation Society as well as a “Rising Star” in the American Society of Transplant Surgeons. Dr. Nadig is the Chief Medical Advisor to Pandorum Technologies, Ltd, Pvt. and his research interests are focused on innovations in transplantation tolerance including cellular therapy, biotechnology/nanotherapeutics, vascular biology in transplantation, immunometabolism and transplant immunology. He serves on the editorial board of the American Journal of Transplantation which is the top ranked journal in transplantation. Dr. Nadig was named as one of Charleston, South Carolina’s Forty under 40 in 2015, is featured in a 2016 TEDx Talk on organ donation, and has a recently published textbook entitled Technological Advances in Organ Transplantation.
- **Amy S. Paller, MD**, is the Walter J. Hamlin Professor and Chair of Dermatology at Northwestern University Feinberg School of Medicine. She is a physician-scientist with 30 years of experience in both laboratory and clinical research. She has had continuous funding from the NIH since 1990 and is currently the PI of the Skin Biology and Diseases Resource-based Center at Northwestern. She co-directs the Department of Dermatology’s T-32 program in cutaneous biology and has trained more than 100 fellows and post docs in the clinical and research settings, most of whom have later assumed careers in academics. She has served on Council at NIAMS and has received awards for teaching, mentorship, and research activities from Northwestern, nationally, and internationally. She has served as Director of the American Board of Dermatology and on the Dermatology Residency Review Committee, attesting to her commitment to trainee education. Her laboratory focuses on diabetic wound healing, with a focus on how the skin keratinocyte communicates with cutaneous dorsal root ganglia and endothelial cells. She has been an expert on signaling pathways in skin and the role of lipid rafts in skin function using mouse, explant, and human skin equivalent models. Her laboratory's collaborative work includes application of nanotechnology to topically deliver gene regulation, including through intact skin, and biomarker discovery using transcriptomic and proteomic tools.

- **Edward B. Thorp, PhD**, is a tenured Associate Professor at the Northwestern University Feinberg School of Medicine in the Departments of Pathology and Pediatrics. He is the Director of Basic & Molecular Science at the Heart Center in the Stanley Manne Children's Research Institute at Ann & Robert H. Lurie Children's Hospital. His research program focuses on how immune cells causally regulate cardiovascular biology and pathophysiology. This includes the study of myeloid cell mobilization, cell metabolism, and organ function during ischemic and allograft stress, such as occurs in arteritis or inflammation of the myocardium and vasculature, and relative to tissue homeostasis. The laboratory also examines cross talk of myeloid cells with adaptive immunity and parenchymal and stromal cells. The goal is to uncover broadly relevant and targetable cell subsets and molecular programming pathways to promote inflammation resolution, immune-tolerance, and ultimately tissue repair or regeneration. Dr. Thorp has several published and in-press manuscripts that exhibit his research group's expertise and focus on cardiovascular crosstalk with the immune system.
- **Susan E. Quaggin, MD**, Division of Nephrology, Department of Medicine. Dr. Quaggin is the Charles H. Mayo, MD, Professor of Medicine, Director of the FCVRR, and Chief of Nephrology and Hypertension. Her research program focuses on vascular biology, kidney development, and kidney disease. One of her major interests is the genetic and molecular pathways that establish and maintain complex capillary structures, particularly those forming the renal glomerular filtration barrier. She also has a robust effort evaluating the role of stem cells in the vasculature. She has expertise in podocytes, transcription factors, branching morpho-genesis, mouse genetics, molecular biology, gene targeting, and Cre-loxP systems. She has two R01 and one P30 NIH awards. Dr. Quaggin has a very strong track record of training and mentoring physician scientists.
- **Lisa D. Wilsbacher, MD, PhD**, Division of Cardiology, Department of Medicine and Department of Pharmacology. Dr. Wilsbacher is Assistant Professor of Medicine (Cardiology) and Pharmacology. Her research focuses on cardiac development and cardiomyocyte maintenance in the setting of pathological stress. Currently, her laboratory investigates the G protein-coupled receptors Sphingosine-1-phosphate Receptor 1 (S1pr1) and Parathyroid Hormone Receptor 1 (Pth1r) and their unexpected roles in cardiomyocyte proliferation and cardiac development. Her research aims to identify the signaling mechanisms that underlie these cardiac developmental effects and to investigate whether S1pr1 and Pth1r signaling contribute to cardiac remodeling in the adult heart.

### Biomedical Engineering:

- **Guillermo A. Ameer, ScD**, Department of Biomedical Engineering and Division of Vascular Surgery, Department of Surgery. Dr. Ameer is the Daniel Hale Williams Professor and Director of Postdoctoral Training in the Department of Biomedical Engineering in the McCormick School of Engineering at NU with a joint appointment in the Division of Vascular Surgery for over a decade. His clinical interests include bioartificial organ systems, cell delivery and transplantation, and tissue engineering. He has created a biodegradable scaffold for use in small blood vessels and

coronary arteries. He currently has NIH, NSF and AHA funding. In his laboratory, he has actively mentored undergraduate students, graduate students, and post-doctoral fellows in the investigation and development of biomaterials suitable for use in tissue engineering.

- **James Carr, MB, BCh, BAO**, is the Chairman of Radiology at Northwestern Memorial Hospital and the director of Cardiovascular Imaging. His specialties include vascular and interventional radiology, cardiac CT and MRI, and Magnetic Resonance Angiography. James C. Carr, MD, attended The Royal College of Surgeons in Ireland, and was awarded his medical degree in 1992. He served his internship and conducted his residency at St. Vincent's University Hospital in Dublin, Ireland (1999). In addition, he is fellowship trained in interventional radiology and cardiovascular imaging at Northwestern University Feinberg School of Medicine/The McGaw Medical Center of Northwestern University (2001). Dr. Carr further received board certification in diagnostic radiology and vascular and interventional radiology from the American Board of Radiology and remains at the forefront of his challenging specialty via memberships and affiliations with prestigious professional societies and associations, such as the Radiological Society of North America, the International Society for Magnetic Resonance, the Society of Interventional Radiology, and is the current president of the Society for Cardiovascular Magnetic Resonance. He is the fellowship director of MRI research and has directly mentored/supervised 75 fellows and students over the last 10 years. He currently is involved in five NIH-sponsored grants as PI or co-PI.
  
- **Luisa Iruela-Arispe, PhD**, Professor and Chair of the Department of Cell and Developmental Biology at Northwestern University. Her research focuses on the signaling pathways that regulate morphogenesis and homeostasis of the vasculature. An effort that has mounted to nearly 200 peer-review publications. A major component of this work has centered on the multiple effects of VEGF and Notch signaling in blood vessels, including their key contributions to diseases such as Alagille and CADASIL. In addition, her research team has contributed to clarify the mechanisms associated with vascular regeneration and the impact of mechanobiology on vascular function, and have received continuous support from the NIH, and specific projects also received support from several foundations, DOD, and industry. Mentoring is a core component of her academic mission. Since 1994, Dr. Iruela-Arispe has mentored 20 graduate students and 23 postdoctoral fellows all who are currently employed in academia, publishing or in industry. In 2002, she created a graduate training in Vascular Biology, a program that has been supported continuously by an NIH T32 award, now in its fourth iteration. In her current role as Professor and Chair of the Cell and Developmental Biology Department at Northwestern University, she is expanding and fostering the growth of a vibrant, diverse and inclusive group of faculty and trainees to address fundamental questions in cell and developmental biology.
  
- **Bin Jiang, PhD**, Assistant Professor of Vascular Surgery, Department of Surgery, and Department of Biomedical Engineering, McCormick School of Engineering. She completed her Ph.D. in Biomedical Engineering from Illinois Institute of Technology and her postdoctoral fellowship at Northwestern University. Dr. Jiang is a biomedical engineer with an engineering laboratory focused on developing innovative solutions for a number of vascular complications, including PAD, AAA, vascular calcification, and diabetic vascular complications. Dr. Jiang has received a

career development award and a transformational project award from the American Heart Association, and an R03 award from the National Institutes of Health. She has published and presented on subjects including angiogenesis, vascular tissue engineering, wound healing, and stem cell engineering.

- **Michael Markl, PhD**, is the Vice Chair for Research in the Department of Radiology at Northwestern University Feinberg School of Medicine. He received his PhD in Physics from the University of Freiburg, Germany (2000), and served as a postdoctoral fellow at the Lucas MRI/S Center at Stanford University, Radiology (2001-2004). In 2004, he returned to the University Hospital in Freiburg, Germany as the Director of Cardiovascular MRI. Dr. Markl has been on faculty at Northwestern since 2011 during which time he has been the Director of Cardiovascular Imaging Research and led Cardiovascular MR research in the Center for Translational Imaging, a Northwestern University core facility housed in Radiology. He is also the Lester B. and Frances T. Knight Professor of Cardiac Imaging in the Departments of Radiology and Biomedical Engineering at Northwestern University. A central objective of Dr. Markl's research program is to develop multi-parametric imaging techniques that can afford a better understanding of the underlying physiologic mechanisms of heart disease and stroke as well as the impact of therapy. The work of his research group has been instrumental in establishing '4D Flow MRI' for the comprehensive assessment of cardiovascular hemodynamics in heart disease and stroke. Further accomplishments include the development, validation, and application of novel imaging tools for the evaluation of structure and function of the heart. Clinical applications have provided new insights into the specific links between pathology, therapy, intervention and functional changes within the heart and cardiovascular system. To date, his accomplishments include a total of >300 peer-reviewed publications, 700+ conference abstracts, 10 book chapters, 12 patents, and >150 invited presentations. In addition, Dr. Markl has a track-record of external funding with over 35 awarded grants from the NIH, societies, and industry collaborations. He has a record of mentorship having trained over 90 medical and graduate students, postdocs, clinical fellows, and junior faculty. These trainees have received prestigious awards from the NIH, AHA, ISMRM, RSNA, and others and have successful careers in academia and industry. Dr. Markl is a recipient of the RSNA Research Trainee Prize, the I.I. Rabi Award Young Investigator Award of the ISMRM, and the Distinguished Investigator Award of the Academy of Radiology Research. He is an Associate Editor for 'Radiology - Cardiothoracic Imaging, a member of the Editorial Boards of the 'European Heart Journal - Cardiovascular Imaging' and 'JCMR', a Fellow of the ISMRM and SCMR, a member of the Board of Trustees of the SCMR, and the Past-President-of the Society for Magnetic Resonance Angiography (SMRA).
- **Samuel I. Stupp, PhD**, Department of Materials Science and Engineering. Dr. Stupp is the Director of the Simpson Querrey Institute for BioNanotechnology and the Board of Trustees Professor of Materials Science, Chemistry, Medicine, and Biomedical Engineering. He is an interdisciplinary scientist whose research combines chemistry, materials science, and medicine. Recent publications have focused on nanostructures, nanofibers, peptides, and self-assembly. Dr. Stupp is an internationally recognized expert in the field of Materials Science and Nanotechnology with participation in five current studies including grants funded by the NIH, the Department of Energy, and the National Science Foundation.

- **C. Shad Thaxton, MD, PhD**, Department of Urology, Simpson Querrey Institute for BioNanotechnology, and the Chemistry of Life Processes Institute at Northwestern. His research is focused on atherosclerosis, cholesterol metabolism, inflammation, cancer biology, biological and chemical engineering, and nanotechnology. In particular, the Thaxton Lab focuses on the synthesis, characterization, and use of biomimetic nanomaterials to better understand the structure-function properties of natural materials. In particular, the Thaxton Lab pioneered the synthesis and characterization of synthetic high-density lipoprotein-like nanoparticles for application as potential therapies for atherosclerosis and cardiovascular disease, inflammation, and cancer. Dr. Thaxton currently has several federally funded projects.

### Clinical Outcomes/Health Services Research:

- **Karl Y. Bilimoria, MD, MS**, is a surgical oncologist and a health services, quality improvement, and health policy researcher at Northwestern University's Feinberg School of Medicine. He is a Vice President for Quality and Information Services for the Northwestern Medicine system leading the Quality Innovation Center. He is also the Vice Chair for Quality in the Department of Surgery and the John B. Murphy Professor of Surgery. His clinical practice is focused on melanoma and sarcoma. Dr. Bilimoria is the Director of the [Surgical Outcomes and Quality Improvement Center of Northwestern University \(SOQIC\)](#), a center of 55 faculty and staff focused on national, regional, and local quality improvement research and practical initiatives. He is the Director of the 56-hospital [Illinois Surgical Quality Improvement Collaborative \(ISQIC\)](#), the Principal Investigator of the 151-hospital [FIRST Trial](#), and the co-PI of the subsequent 215-hospital [SECOND Trial](#). He is a Faculty Scholar at the American College of Surgeons. He has published more than 400 scientific articles, including numerous publications in *JAMA* and the *New England Journal of Medicine*. Dr. Bilimoria's research is funded by the National Institutes of Health, the Agency for Healthcare Research and Quality, Health Care Services Corporation, and numerous others, totaling over \$35,000,000. He is a past president of the Association for Academic Surgery. He has mentored more than 40 research trainees and was awarded Mentor of the Year by Northwestern's Feinberg School of Medicine. He was recently listed by Becker's as one of the "Top 50 Experts Leading the Field of Patient Safety" in the U.S.
- **Mark K. Eskandari, MD**, Division of Vascular Surgery, Department of Surgery. Dr. Eskandari is The James S.T. Yao, M.D., Ph.D. Distinguished Professor of Vascular Surgery and Professor of Surgery, Medical Education, and Radiology. His research endeavors include clinical trials investigating the use of stent grafts for the treatment of abdominal and thoracic aortic aneurysms, carotid stent systems for stroke prevention, and lower extremity endovascular interventions for limb preservation. An internationally recognized expert in carotid artery stenting and aortic aneurysm stent grafting, he has served as course director for several national carotid stenting and aortic stent grafting training programs for other physicians. His bibliography includes over 250 peer-reviewed manuscripts/book chapters, as well as over 200 local, national, and international presentations on the treatment of vascular disease. A dedicated educator, Dr. Eskandari has been the recipient of awards for excellence in research, excellence in teaching at Northwestern

University, the Lifeline Foundation's Wylie Fellowship award, and the NMFF Physician Clinical Excellence Award for Clinical Innovation.

- **Joseph M. Feinglass, PhD**, Research Professor of Medicine in the Division of General Internal Medicine and Geriatrics. Dr. Feinglass has over 20 years of experience in social epidemiology research, health disparities, quality improvement, and health policy. Dr. Feinglass was the recipient of the NU Masters of Public Health Degree Program Mentor of the Year and the Peripheral Arterial Disease Coalition's Best PAD Research Award. Dr. Feinglass is currently the contact PI on the NIH-funded Chicago Cancer Health Equity Collaborative and has served as co-investigator on four NIH-funded studies as well as multiple state and local grants.
- **Andrew W. Hoel, MD**, is an Associate Professor in the Division of Vascular Surgery, Department of Surgery. He is actively involved in multiple quality improvement efforts within Northwestern Medicine as the Director of Outcomes and Quality Improvement for Vascular Surgery and within the region through the Society for Vascular Surgery-Vascular Quality Improvement Mid-America Vascular Study Group. In 2016, Dr. Hoel was awarded the Midwestern Vascular Surgical Society (MVSS) Travel Fellowship Award, and later became a member of the MVSS Education Committee. Dr. Hoel has an active research enterprise that focuses on improving the management of aortic disease with minimally invasive technology and techniques, improving the patient outcomes and quality of patient care.
- **Yue-Yung Hu, MD, MPH**, is a pediatric surgeon and a health services researcher at the Northwestern University Feinberg School of Medicine. She is an Assistant Professor in the Department of Surgery and the Associate Program Director of the General Surgery Residency Program. She studies surgical education, focusing particularly on surgeon wellness and diversity, equity, and inclusion. She is co-principal investigator of the Surgical Education Culture Optimization through targeted interventions based on National comparative Data (SECOND) Trial, a national cluster-randomized controlled trial of 215 general surgery residency programs that aims to improve the learning environment and resident well-being. The SECOND Trial launched an extension for vascular surgery programs in 2020.
- **Donald M. Lloyd-Jones, MD, ScM**, Department of Preventive Medicine and Division of Cardiology, Department of Medicine. Dr. Lloyd-Jones is the Eileen M. Foell Professor and Chairman of the Department of Preventive Medicine. His interests lie primarily in preventive cardiology, particularly in regards to investigating the life course of cardiovascular and brain health and disease, with a focus on molecular mechanisms, risk, and risk mitigation. He has been an active investigator in >100 grant-funded studies of clinical and translational science, the vast majority funded by NIH. Dr. Lloyd-Jones is a recipient of numerous teaching and mentoring awards, including the Patterson Award for Teacher of the Year from the Department of Medicine and the Teacher of the Year from the Division of Cardiology at Northwestern. In 2013, he was awarded Northwestern's Tripartite Legacy Award in recognition of his achievements as a mentor, leader, and translational physician-scientist. He is the President-Elect of the American Heart Association for 2020-21, and will serve as President in 2021-22. He will also serve as part of the "mentoring

the mentor” aspect of the training program to help younger faculty develop into effective mentors.

- **Mary M. McDermott, MD**, is the Jeremiah Stamler Professor of Medicine in the Division of General Internal Medicine and Geriatrics and Preventive Medicine. She is an internationally recognized expert in functional impairment and functional decline in patients with peripheral arterial disease. She is a clinical trialist focusing on interventions to improve walking performance in people with PAD. Her research interests include clinical trials, functional outcomes, and peripheral artery disease. She is PI on seven NIH-funded grants and an AHA funded Strategically Focused Research Network Award. Dr. McDermott is experienced in many methodologies in clinical investigation including randomized trials. She has published more than 280 peer-reviewed articles and served as Chair of the American Heart Association’s Council on Peripheral Vascular Disease (PVD). She has mentored over 30 trainees including students, residents, fellows, and junior faculty. She is a Deputy Editor for JAMA.
- **Douglas E. Vaughan, MD**, Division of Cardiology, Department of Medicine. Dr. Vaughan is currently the Irving S. Cutter Professor of Medicine and Chairman of the Department of Medicine at Northwestern University Feinberg School of Medicine and Physician in Chief of Northwestern Memorial Hospital. Dr. Vaughan’s clinical interests include regenerative medicine, ischemic heart disease, lipid disorders, hypercoagulable states, atherosclerosis prevention, coronary artery disease, and acute coronary systems. For the last two decades, his laboratory has been involved in basic and preclinical investigations that have helped to define the molecular physiology of PAI-1 and its role in arterial thrombosis and arteriosclerosis, as well as the regenerative therapies for treating ischemic diseases, and is now looking forward to developing and testing of PAI-1 antagonists for use in man. He is PI of an NIH R01. Dr. Vaughan is also the author or co-author of over 200 publications.
- **Ashley K. Vavra, MD**, Division of Vascular Surgery, Department of Surgery. Dr. Vavra recently joined the Division of Vascular Surgery as Assistant Professor of Surgery. In her previous position at University of Colorado Anschutz medical campus in Aurora, CO, she served as both the practice director for the Division of Vascular Surgery and the medical director for the Vascular Diagnostics Laboratory at the University of Colorado Hospital. She was also founder and director of the Quality Improvement and Leadership Track in Surgery (QuILS) for surgical residents - a novel curriculum founded in 2017 designed to train future leaders of surgery to implement sustainable change in their clinical practice. Dr. Vavra’s bibliography contains over 25 peer-reviewed manuscripts, review articles, and book chapters. She has received multiple awards for presentation of research in addition to teaching, mentorship and leadership awards as both a trainee and faculty member. She is very involved in quality improvement and patient centered care in surgery and completed a Master’s degree in Healthcare Quality and Patient Safety in 2020.

...

# Northwestern

## Vascular Surgery Scientist Training Program (VSSTP)

Division of Vascular Surgery | Northwestern University, Feinberg School of Medicine  
676 N. St. Clair St., Suite. 650, Chicago, IL 60611 | Tel: (312) 926-7775

---

### **Program Director:**

Mark K. Eskandari, M.D., F.A.C.S.  
The James S. T. Yao, MD, PhD, Professor of Vascular Surgery  
Chief and Program Director, Division of Vascular Surgery  
Northwestern University  
Feinberg School of Medicine  
676 N. St. Clair, Suite 650  
Chicago, IL 60611

### **Contact:**

Marsha Blunt, VSSTP Program Coordinator  
676 N. St. Clair, Suite 650  
Chicago, IL 60611  
Email: [marsha.blunt@nm.org](mailto:marsha.blunt@nm.org)  
Tel: (312) 926-7775

**Website:** <https://www.surgery.northwestern.edu/divisions/vascular/research/scientist-training.html>