Education at URMC – Program Features

Program: Vascular Surgery –
Board certification training for Vascular Surgery

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About the Program

The Department's educational mission is underscored by its General Surgery Residency Program with 7 ACGME approved residency training programs or fellowships that include:

- General Surgery Residency
- Cardiothoracic Residency
- Cardiothoracic Fellowship
- Plastic and Reconstructive Surgery Residency
- Vascular Residency
- Vascular Fellowship
- Trauma/Critical Care Fellowship

The Department offers a translational research experience for those interested in a doctoral degree in the basic sciences, which is supported by surgical research mentors or for those postgraduates who would like postdoctoral fellowships in the translational research cores.

The Department hosts numerous educational symposia, conferences and seminars, which are organized and coordinated through the Office of Surgical Education. There are over 20 weekly conferences, clinics or seminars.

We are committed to providing the very best training so that our residents will enter into academic practice with a broad but complete education. It is our hope that our vascular residents will continue within academia and inspire others with their skills and knowledge.

Facilities

Our vascular surgery residents have access to surgical facilities at two Rochester hospitals and do a one-month rotation with a vascular faculty member at his offices in the Finger Lakes, in the resident's third year, as well as private practice clinics staffed and operated by URMC physicians and faculty.

Strong Memorial Hospital offers one of the largest, best equipped surgical facilities in the nation. The up-to-date facilities of affiliated Highland Hospital concentrate on bariatric, breast and a number of other procedures, conducted in a more intimate setting.

The physicians in the Division of Vascular Surgery have private-practice clinics, where a wide variety of procedures suited to an out-patient model are conducted, including training resients in the University Vein Center, and in the Outpatient Ultrasound Clinic. By the end of the residency, you will be eligible to sit for the ARDMS certifying exam.

Research

Research on Venous Disease

In recent years, research into venous disease has lagged far behind that for arterial disease. Still, venous disease is a serious threat to life and health through conditions such as pulmonary embolisms and leg ulcers. The Division of Vascular Surgery is moving this field forward through an approach that combines both clinical and basic science.

The laboratory of David Gillespie, MD is looking into many aspects of venous disease:

His basic science research has two major projects.

The central premise of the first research project is that increased rates of VTE in high risk patient populations correlate with elevated circulatory microparticle levels and, furthermore, we hypothesize the entirely novel approach that following trauma or surgery, the pulmonary vasculature may be more susceptible to VTE formation due to increased pro-inflammatory pathways. To date, there are limited effective preventative measures (beyond anti-coagulation)

for DVT and PE prophylaxis. By understanding the cell biology, this research will test the paradigm shifting hypothesis that in PE and DVT, intrinsic differences in the affected vascular beds contribute to the disease process. Additionally, these experiments should yield exciting results that identify new targets for risk reduction in high-risk patients.

- The second focus of his lab is investigating the impact of Monocyte Derived Tissue Factor on the development of venous thrombosis after surgery/trauma. Performed in collaboration with Drs. Cullen and Miller-Graziano, this promising work is on the cutting edge of increasing patient safety. Both projects are in the process of acquiring funding by the National Institutes of Health (NIH).

- Dr. Gillespie is the Principal Investigator of a prospective multicenter trial called RECON investigating quality of life improvements after laser vs. radiofrequency ablation for the treatment of varicose veins. He is also the site PI for the multicenter NIH-sponsored ATTRACT trial, investigating quality of life improvements using thrombolysis in the treatment of deep vein thrombosis (DVT).

The laboratory of John Cullen, PhD is researching how alcohol or its metabolite, acetaldehyde, affect the development of atherosclerosis and alter the immune response. While studies have demonstrated abnormal adaptive and innate immunity and an increased risk of heart attack as a result of alcohol intoxication or abuse, the precise cellular mechanisms whereby alcohol elicits these effects are unclear.

Alcohol and Atherosclerosis: The investigation of the effects of ‘moderate' and 'binge' alcohol consumption and it’s metabolite, acetaldehyde, on inflammation and vascular remodeling, pivotal in the development and destabilization of the atherosclerotic plaque, are underway. These studies utilize the genetically modified apolipoprotein E knockout (apo E k/o) mice, which after surgical intervention and a high fat diet, develops an unstable atherosclerotic plaque with many of the key characteristics seen in humans. Patients undergoing carotid endarterectomy are also enrolled in this study: their serum and intraplaque biomarkers are correlated with their pattern of alcohol consumption.

Alcohol and the Immune Response: Using a humanized mouse that is engrafted with human hematopoietic stem cells to generate a functional human immune system we are determining how alcohol or it’s metabolite, acetaldehyde, alter the expression of human monocyte inflammatory mediators and receptors and alter the immune system. This research should provide valuable new information central to our understanding of the effects of alcohol intoxication or abuse on the development of complications in patients after surgery, infection or trauma. Because mortality from surgical, infectious or trauma-related complications is so high following alcohol intoxication or abuse, understanding precisely how alcohol increases this risk is clearly of major significance and clinical importance, and will provide significant new information that should enable the development of potential targets for therapeutic modulation which would enhance tissue repair and restoration.

The laboratory of David Morrow, PhD is researching methods to predict vascular diseases by viewing signaling pathways of vascular cells:

- Dr. Morrow's research has a central focus on developmental signaling pathways such as Notch and Hedgehog (Hh) which play a pivotal role in cell fate determination in adult Vascular Cells. Vascular smooth muscle cell growth plays a prominent role in neointimal formation during the pathogenesis of atherosclerosis, hypertension and vascular remodeling in response to injury. However, how vascular smooth muscle cell growth is regulated remains poorly understood. Using novel in vitro technologies (perfused transcapillary) in conjunction with an established model of flow- induced vascular remodeling (carotid ligation model) and novel technologies such as laser capture microscopy and in- vivo siRNA delivery, the goal of our research is to delineate the role of a Hh/VEGF/Notch axis in mediating flow-induced changes in SMC growth. It is hoped that our research will provide valuable new information central to the understanding of the novel role for Hh/VEGF/Notch signaling in vascular biology, and thus further our knowledge of the critical role of this signaling cascade in the etiology of vascular disease.

The laboratory of Eileen Redmond, PhD is studying the effects of ethanol on cardiovascular diseases:

- Dr. Redmond's lab investigates vascular effects of ethanol (i.e., the alcohol found in alcoholic beverages) and of red wine polyphenols (e.g., resveratrol, quercetin) using cultured human cells *in vitro* in combination with *in vivo* models of vessel remodeling and atherosclerotic plaque. The role of mechanical forces associated with pulsatile blood flow and their critical effects on vascular cell biology and function in the context of cardiovascular disease is also of great interest and the lab utilizes state-of-the-art techniques to determine signal transduction pathways that are modulated in vascular cells exposed to controlled conditions of shear stress, pulse pressure and stretch.

What makes us Unique?

The 0+5 integrated vascular surgery residency program at the University of Rochester dedicates 5 years to clinical training in vascular surgery, with some core rotations in general surgery and vascular disease. The 0+5 training paradigm leads to primary board certification in vascular surgery as well as a *Registered Physician for Vascular Interpretation* (RPVI) board certification. As one of the first institutions to embrace an integrated training program, we have matched extremely strong applicants.

We specifically take pride in our serious commitment to our educational endeavors for our integrated vascular residents. This commitment is reflected in our educational curriculum which includes daily conferences (see Conference Schedule), attending teaching rounds, dedicated time on the endovascular simulator, high volume of open and complex endovascular cases (numbers of procedures are consistently over the 95th percentile), a nationwide resident focused research symposium, and abundant research and presentation opportunities at national meetings (see Current Residents).

Our residents are trained in the technical aspects of all vascular disease, including carotid, aortic, thoracic outlet, renal, visceral, infra-inguinal, venous, lymphatic, dialysis access pathology and vascular trauma. Endovascular interventions include angioplasty and stenting of arterial, venous and dialysis access beds, deployment of fenestrated and complex grafts, mechanical and pharmacological thrombolysis, inferior vena cava filter placement and retrieval through fluoroscopic imaging or use of intravascular ultrasound, Duplex guided thrombin injection, and others. Our volume of open procedures remains high and frequently include aorto-bifemoral, fem-fem, ax-fem and lower extremity bypasses, thoracic outlet decompression, complex dialysis accesses procedures (including DRILs and leg fistulas), and spine exposures. As the encatchment area of western NY, our institution serves as a highly skilled tertiary referral center for vascular surgery.

We are committed to providing the very best training so that our residents will enter into academic practice with a broad but complete education. It is our hope that our vascular residents will continue within academia and inspire others with their skills and knowledge.