



MASSACHUSETTS
GENERAL HOSPITAL

VASCULAR AND ENDOVASCULAR SURGERY
A DIVISION OF THE DEPARTMENT OF SURGERY



THE TRAINING PROGRAM IN VASCULAR AND ENDOVASCULAR SURGERY
AT THE MASSACHUSETTS GENERAL HOSPITAL
BOSTON, MASSACHUSETTS

INTRODUCTION:

The Massachusetts General Hospital, a private voluntary institution built by public subscription, received its charter from the Commonwealth of Massachusetts in 1811. This charter defined its mission as the care of the sick and the education of those who provide this care. Today it is a large complex medical center but this mission remains the same. The Massachusetts General Hospital (hereafter MGH) is a major teaching hospital for Harvard Medical School with an important role in the instruction of medical students, residents and fellows in all specialties.

In 1994 there was a well-publicized merger with the Brigham & Women's Hospital and the Massachusetts General Hospital with each institution being flagship components of the far-reaching Partners Healthcare Network. Both hospitals maintain the full spectrum of acute care services with no plans for service consolidation.

The Division of Vascular and Endovascular Surgery is one of 9 divisions within the Department of Surgery at the Massachusetts General Hospital with broad clinical programs for both primary and tertiary care problems; approximately 1,500 inpatients are treated each year. Included in Division responsibility is the non-invasive clinical vascular laboratory which sees over 10,000 patients per year and has expertise in cerebral and peripheral vascular diagnostic modalities. Also included within the Division is the Vascular Surgery Research Laboratory under the direction of Michael T. Watkins; M.D.; principle areas of investigation include ischemic/reperfusion injury and spinal cord protection. There is also an active clinical research program including ongoing clinical trials which are an integral part of the academic program. There is close collaboration with the Cardiology interventional program at the MGH with a joint conference and collaborative protocols for a variety of endovascular interventions, including carotid stenting.

OUTLINE OF THE VASCULAR SURGERY TRAINING PROGRAM:

The training program is a combined two-year ACGME accredited program of research and clinical activities that are designed both for individuals who intend to continue in academic surgery or enter private practice. Virtually all trainees in the program to date have been Board eligible in General Surgery by virtue of completing a five-year General Surgery Residency. Imminent changes in training paradigms may change this in the near future. The first year is devoted to work in basic research, clinical

research, the Vascular Laboratory, and endovascular skills. The details of these aspects of the program will be described below. The second year of this program is as a Fellow on the inpatient Vascular/Endovascular Surgery Service in which about 1,200 open (or combined endovascular) surgical cases are performed yearly. The vascular resident's primary responsibility is to be a leader of the patient care team. The second year provides an in-depth and broad exposure to both routine and complex vascular surgical problems. The vascular resident is included in patient care from initial outpatient evaluation to long-term follow up. The year is structured to provide training in the appropriate use and integrated interpretation of diagnostic modalities, to develop vascular surgical judgment, and to gain technical expertise in the surgical management of a wide range of vascular surgical procedures. Administrative experience is gained by the residents in the day to day running of Service activities such as rounds, conferences, and schedules. It is expected that during this second year, the Fellow will take a strong role in all educational components of the Vascular Service. Residents in the two-year program are selected via the National Resident Matching Program. Two positions are available each year. Acceptance into this program means that fellows selected in the matching program automatically proceed to a two-year fellowship.

DESCRIPTION OF CLINICAL SERVICES:

As mentioned above, there are two Fellows on the clinical Vascular Service per year. The Fellow's time is divided between two Service teams of attending surgeons designated as the Linton and Darling Services; such designation honors the memories of Robert R. Linton, M.D., the founder of Vascular Surgery at the MGH and his protégé, R.Clement Darling, Jr., M.D., whose clinical and academic contributions established the MGH as a major academic center for Vascular Surgery. The clinical Vascular Service performs about 1,200 open cases per year. Although 100 cases per year are required by the American Board of Surgery to be eligible for certification in vascular surgery, our residents list well over 300 cases as primary surgeon and participate actively in many more cases in addition to that. The caseload ranges from complex aortic arch, thoracoabdominal, aortorenal, and mesenteric artery reconstructions to distal tibial/pedal artery bypass procedures. There are also many standard reconstructions performed. Stent graft repair of both AAA and thoracic aortic aneurysms are routinely performed. The vascular resident does not have much primary responsibility for vascular trauma, which is done on a Trauma Service. However, an appropriate balance of emergency reconstructions is

included in the clinical experience. The Vascular Service serves as consultant to the Trauma Service for treatment of vascular trauma.

The patient care responsibilities of the Vascular Fellow are structured to maximize educational and training opportunities. Strong ancillary services, including a service-dedicated Physician Assistant, as well as the presence of more junior residents, obviate much of the need for junior resident type responsibilities. It is expected that the vascular resident will retain primary responsibility for the patients on whom he or she has operated and attention to administrative detail for these patients is expected. The vascular resident takes no in-house call but is expected to be available for inpatients and urgent transfers during the week and to rotate backup weekend call. In addition to the two Vascular Residents, there are general surgery residents assigned to the Vascular Service - two in their final (PGY-5) year and two at junior levels. Each Service is thus comprised of an administrative Vascular Fellow, as well as a senior and junior resident; Vascular Fellows are responsible for assigning case coverage. Vascular Fellows and residents perform approximately 80% of cases on the Vascular Service as primary operators.

NON-INVASIVE CLINICAL VASCULAR LABORATORY TRAINING:

The Non-invasive Clinical Vascular Laboratory performs over 10,000 hemodynamic studies per year including transcranial Doppler, duplex carotid evaluation, peripheral arterial and venous studies, and graft surveillance. The Vascular resident has a significant exposure to interpretation of vascular laboratory studies learning the way in which hemodynamic measurements are made, how to interpret them, and how to utilize that information in patient care. There is also dedicated training time in the laboratory during the first year. Primary responsibility for non-invasive training will transition as of January 1, 2005, to Michael Jaff, D.O., a nationally respected Vascular Medicine expert recently recruited as Medical Director of the Non-Invasive Laboratory. Hands-on experience in the laboratory is mandatory in the first year of the program and all Fellows learn non-invasive testing. The development of expertise in vascular lab organization is thus acquired readily and is sufficient to ensure the trainee can participate in or run a vascular lab. In addition, there are several ongoing clinical studies in the Vascular Lab in which residents may participate and there is sufficient volume to support any other innovative clinical investigations. Passage of the Registered Vascular Technologist (RVT) exam is encouraged but not required. Since this aspect of the program was implemented in 1994, most finishing residents have

passed the RVT exam.

ENDOVASCULAR SKILLS TRAINING:

A programmatic shift and expansion recently occurred on the Vascular Service at the MGH. While an active AAA stent graft program (with some 700 implants to date) has been in place since 1995, percutaneous endovascular work was formerly referred by the Vascular Surgery group to other specialists. Our endovascular program expansion was, in part, driven by training considerations for our Vascular Fellows. Two vehicles were used to expand the program: first, three present faculty took time away to complete advanced fellowships and satisfy SVS/AAVS guidelines for credentialing in percutaneous endovascular therapy. In addition, a new faculty member with an extensive, comprehensive endovascular practice was recruited and is currently on site. Thus, four Vascular Surgery Attendings are fully credentialed for the spectrum of endovascular therapy. Percutaneous procedures are performed both in the Cardiac Catheterization Suite and a state-of-the-art endovascular suite in the operating room (opened February 2003) is one of the Service home bases. Effective July 2002, first year Fellows spend two to three days per week (for six months each) performing percutaneous endovascular procedures. The volume of procedures is such that during a six-month period, each Fellow will more than satisfy SVS/AAVS guidelines for competency in endovascular procedures (100 catheterizations, 50 interventions). Stent graft procedures (performed in the OR) are performed by second-year Fellows, thus affording continuity in endovascular training throughout the program. Each week there are two teaching/working conferences: Vascular Rounds for the presentation of the spectrum of vascular surgery and Joint Vascular Surgery/Cardiology Interventional Conference. In addition, a weekly morbidity and mortality conference is held.

OUTPATIENT EXPERIENCE:

The Vascular Fellow has a generous exposure to the outpatient evaluation of patients with vascular disease. The fellow spends one full day per week in the office of a senior staff member with whom he or she is working. During this protected time, the vascular resident evaluates patients prior to admission and sees patients in follow up after operative intervention or hospital discharge.

BASIC RESEARCH PROGRAM:

Resident participation in the basic science program is included in the first year. It is primarily designed to teach critical, analytical thinking about fundamental issues in vascular biology as particularly relevant to vascular surgery. One year usually is not enough to achieve full competence in basic research skills, however the broad exposure to research projects will allow the trainee to participate in research programs in their future career if desired.

There are several divisional research programs ongoing. There is a basic study of the effects of fluid shear and oxidative stress on human saphenous vein endothelial and smooth muscle cell function in a tubular tissue culture system developed at our laboratories through a collaboration with MIT's fluid engineering laboratories. Another major *in vitro* project involves analysis of endothelial and smooth muscle cell responses to ischemia/reperfusion injury. These cells' genetic and synthetic properties are analyzed using state of the art gene-chip and proteomic methods. A murine model of limb ischemia reperfusion has been developed in the laboratory to exploit transgenic and knockout models to obtain basic information regarding the pathogenesis of local and remote tissue injury. In addition, a murine model of spinal cord ischemia and its modulation has produced a variety of prominent Fellows' scientific presentations. Multi-disciplinary collaborations are ongoing with other laboratories at MGH, Harvard and the Massachusetts Institute of Technology.

The Edwards Vascular Surgery Research Laboratory, at the main hospital complex, houses the vascular research laboratory. It is a 2000 sq. foot laboratory devoted to Vascular Surgery. Facilities are present for biomechanical studies of vessels and grafts, small animal surgery, and cell culture. This laboratory is under the direction of Dr. Michael Watkins. Also available are large animal surgery facilities and the Wellman laboratory for studies involving photobiology and medicine.

BASIC SCIENCE SEMINARS:

Unique to the Boston area training programs is a joint Basic Science Seminar program which has run continuously for some 16 years. Eight evenings a year, residents from all Boston area programs gather for a tutorial on a basic science topic followed by a social occasion including dinner. Residents in both years of the MGH program are encouraged to attend.

CLINICAL RESEARCH PROGRAM:

Resident participation in the Clinical Research Program is mandatory and is designed to develop

critical thinking about clinical vascular surgery problems. Extensive computer support is available including an ongoing vascular registry for clinical research. Two clinical research nurses help coordinate the acquisition and analysis of data. Vascular residents in the research and/or the clinical year are encouraged to take advantage of the extensive case material which is available for study. Each resident is assigned at least one clinical research project. The newly-established Center for Clinical Effectiveness within the Department of Surgery is under the direction of a vascular surgeon (Dr. William M. Abbott). Clinical research opportunities in conjunction with the Center have proven fruitful. Dr. Cambria maintains primary responsibility for this activity.

BIOGRAPHICAL SKETCHES OF VASCULAR DIVISION FACULTY:

RICHARD P. CAMBRIA, M.D.

Dr. Cambria is a graduate of the College of Physicians and Surgeons of Columbia University and received his surgical and vascular surgical training at the Massachusetts General Hospital. He is Visiting Surgeon at the Massachusetts General Hospital and Professor of Surgery at Harvard Medical School. He serves on the Editorial Boards of the Journal of Vascular Surgery, Surgery, Vascular and Endovascular Surgery, Perspectives in Vascular Surgery and the International Cardiovascular Journal. He is a member of numerous surgical societies including The American Surgical Association. His clinical research interests are in complex thoracoabdominal aortic reconstruction, risk stratification in vascular surgery, spinal cord protection and renovascular disease. He is the author or co-author of more than 150 scientific papers and textbook chapters. Dr. Cambria has extensive experience in complex aortic reconstruction, especially thoracoabdominal aneurysms and is widely recognized as an authority in this area. He is Co-Director of the MGH Thoracic Aortic Center - a multi-disciplinary group with extensive experience in the management of the spectrum of thoracic aortic pathology. Dr. Cambria was appointed Chief of Vascular Surgery, effective January 1, 2002, and serves as Program Director for the Vascular Fellowship.

WILLIAM M. ABBOTT, M.D.

Dr. Abbott, Professor of Surgery at the Harvard Medical School, recently retired from clinical practice. He received his M.D. from Stanford University School of Medicine and his surgical training at the Massachusetts General Hospital where he remained on faculty upon its completion. He was Chief of

Vascular Surgery at Massachusetts General Hospital from 1978-2001. He has been active in societies and committees at the national and international level and is Past President of the Society for Vascular Surgery and current President of the New England Society for Vascular Surgery. He served for many years on the Editorial Board of the Journal of Vascular Surgery. He has served on a NIH Study Section. He is the author or co-author of more than 250 scientific papers. He maintains independent interest in educational training issues for vascular surgeons and leads the Department's Center for Clinical Effectiveness.

DAVID C. BREWSTER, M.D.

Dr. Brewster is a graduate of the Columbia University College of Physicians and Surgeons and received his surgical training at the Massachusetts General Hospital where he remained on faculty upon completion. He is currently a Visiting Surgeon at the Massachusetts General and Clinical Professor at Harvard Medical School. He has been active in Societies and Committees at the National and International level and recently served on the Editorial Board of the Journal of Vascular Surgery. He is Past President of the New England Society for Vascular Surgery and Treasurer of the International Society for Cardiovascular Surgery, North American Chapter, now the American Association for Vascular Surgery. He is the author of more than 250 papers and book chapters. Clinical interests include the spectrum of general vascular and endovascular surgery. Dr Brewster has spearheaded the stent graft program at the MGH and is internationally recognized for his contributions in this area.

GLENN M. LAMURAGLIA, M.D.:

Dr. LaMuraglia received his M.D. from Harvard University and trained in general and vascular surgery at the Massachusetts General Hospital where, following his training, he remained on the faculty. He is currently Associate Professor of Surgery at the Harvard Medical School. Dr. LaMuraglia is a member of numerous regional and national societies and is presently Councilor of the New England Society of Vascular Surgery. He has strong clinical and research interests in the development of and application of photobiology upon vascular surgical problems. He is on the editorial board of Lasers in Medicine and is the author of over 110 scientific papers and chapters. His clinical interests include the spectrum of vascular and endovascular surgery.

CHRISTOPHER J. KWOLEK, M.D.

Dr. Kwolek is a graduate of the University of California, San Francisco School of Medicine and

received his vascular surgical training at the Massachusetts General Hospital. He also spent additional time as an endovascular fellow at the Arizona Heart Institute. He is on the editorial board of the Journal of Endovascular Therapy and is a member of numerous societies including the Society for Vascular Surgery, the American Association for Vascular Surgery and the International Society for Endovascular Therapy. Due to his extensive experience in endovascular procedures including stent grafting, thrombolysis, renal and visceral artery angioplasty/stenting, carotid angioplasty/stenting, SFA/tibial intervention and venous intervention, Dr. Kwolek was recently recruited back to the MGH from the University of Kentucky where he served as director of Vascular and Endovascular Surgery. His clinical and research interests include endovascular procedures, device development and outcomes measures to evaluate vascular procedures as well as the full spectrum of open vascular procedures. He has made numerous regional and international presentations in the area of endovascular/vascular therapy and is the author/co-author of over 40 book chapters and articles.

SUMMARY:

The Vascular Surgery Division at the Massachusetts General Hospital provides its Fellows with a broad reaching experiences in technical aspects of vascular surgery, endovascular surgical skills, and the development of surgical judgment and maturity. Specifically, the latter is afforded by the Fellow's teaching and leadership roles on the Clinical Service. In addition, a dedicated staff presents multiple opportunities for academic development in both clinical and basic research spheres. At the Massachusetts General Hospital we remain very interested in serious applicants from training programs other than our own, and in fact, at least half of our trainees over the years have come from general surgical residencies other than the Massachusetts General Hospital. All individuals who complete an application via ERAS are welcome to make an informal visit to the Massachusetts General Hospital by previous arrangement. Shortly after all applications are received, selected individuals will be invited for a formal interview to be held in March/April 2005. At the time of the formal interview, current residents and staff will meet with the applicants. Tours will be given by the residents at which time they will answer any questions about the program.