CVC Advanced Interventional Fellowship Program (Structural & Endovascular)

The program's educational goal is to train the future leaders in the field of endovascular therapy of cerebrovascular, peripheral vascular, and structural heart disease. This requires a broad and diverse clinical experience, a commitment to academic research, and the ability to teach others.

The CardioVascular Center (CVC) is a highly specialized center with a focus on diagnosis and treatment of cardiovascular diseases and emphasis on modern catheter-based techniques that can often replace conventional surgery. The facility houses two state-of-the-art catheterization laboratories, a premier noninvasive cardiology and vascular laboratory, and an outpatient clinic.

The CVC performs approximately 2,000 interventions per year including:

- Left and right heart catheterization
- Percutaneous coronary intervention
- Closure of congenital intracardiac shunts
  - Patent foramen ovale, atrial septal defect
  - Ventricular septal defect
  - Patent ductus arteriosus
- Mitral, aortic, pulmonic, and tricuspid valvuloplasty
- Percutaneous aortic valve implantation
- Catheter-based mitral valve repair
- Paravalvular leak closure
- Septal ablation for hypertrophic cardiomyopathy
- Left atrial appendage closure
- Peripheral angiography
- Peripheral artery balloon dilation and stent implantation
- Percutaneous treatment of thoracoabdominal aneurysm
- Balloon angioplasty of aortic coarctation
- Balloon dilation of pulmonary artery stenosis
- Renal denervation

- Carotid angiography
- Carotid stenting

The noninvasive vascular laboratory performs >5,000 examinations per year. These include

- Resting and exercise ECG
- Doppler echocardiography
- Transesophageal and transthoracic echocardiography
- Carotid ultrasound
- Upper and lower extremity vascular ultrasound
- Renal ultrasound

In addition, the CVC is the home to various annual scientific meetings. The Congenital and Structural Interventions (CSI) Congress is the premier conference that
provides a comprehensive overview of major topics in catheter therapy of congenital and structural heart disease both in adults and children. The Carotid Angioplasty and other Cerebrovascular Interventions (ICCA) provides an update on latest developments in interventional techniques, materials, and strategies for treating carotid, vertebral, and intracranial disease including acute stroke. Other workshops include LAA (closure of Left Atrial Appendage) and TRENDS (Device-based therapy for hypertension).

Fellowship Objectives:

1. Medical Knowledge
   a. Understand and apply pathophysiology concepts in cerebrovascular, peripheral vascular, and structural heart disease
   b. Understand and apply concepts of noninvasive imaging and assessment to cerebrovascular, peripheral vascular, and structural heart disease
   c. Understand and apply the indications and contraindications of procedures and techniques
   d. Understand and apply the use of current devices and interventional techniques to treat cardiac and vascular conditions
   e. Learn how to predict, recognize, and manage complications of interventional procedures and techniques
   f. Learn when and how to perform post-procedural follow-up

2. Patient-Based Learning and Improvement – Fellows must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning. Fellows are expected to develop skills and habits to meet the following goals:
   a. Identify strengths, deficiencies, and limits in one’s knowledge and expertise
   b. Establish learning and improvement goals
   c. Identify and perform appropriate learning activities
   d. Systematically analyze practice, using quality improvement methods, and implement changes
   e. Incorporate formative evaluation feedback into daily practice
   f. Educating members of the catheterization laboratory and staff

3. Professionalism – Fellows must maintain a commitment to carrying out professional responsibilities, an adherence to ethical principles, and sensitivity to patients of diverse backgrounds
   a. Compassion, integrity, and respect for others
   b. Responsiveness to patient needs that supersedes self interest
   c. Accountability to patients, society, and profession
   d. Sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion and sexual orientation

4. Scientific Research - Fellows must show a commitment to clinical research. This should include self-generated projects within the field of peripheral intervention, cerebrovascular disease, and structural heart disease. Research should be submitted to scientific journals and conferences. It is expected that fellows spend approximately 50% of their time with research. Possible study designs include
   a. Description of best techniques for existing technology
   b. Identification of additional applications for existing technology
c. Quantification of effectiveness, procedural success rates, and long-term outcomes for interventional procedures and techniques

d. Participation in/coordinated of clinical studies

5. Conference organization and coordination – Fellows will be involved with the scientific world at large. This includes being involved with scientific conferences and engaging in discussions with leaders in the field.

a. Understand the process behind organizing a scientific conference

b. Coordinating lecture topics and speaker presentations

c. Establishing long-term relationships with members of the worldwide scientific community.

Fellowship Curriculum:

The fellow will have specific clinical responsibilities. He/she is given the responsibility for procedure care of acute and chronically ill patients in the catheterization laboratory under the supervision of faculty members in the CVC.

The trainee will be involved in all aspects of critical decision making, including review of published data, complete and incomplete revascularization, short- and long-term benefits of intervention, risks of percutaneous intervention vs. surgical and medical therapies, as well as strengths and limitations of noninvasive and invasive evaluation. Trainees will review prior angiographic films, vascular ultrasound, computerized tomography and magnetic resonance imaging under supervision to acquire knowledge in the decision-making process that leads to the selection of medical therapy vs. intervention. Pre-interventional procedural evaluation and planning are conducted with the supervising faculty member. In addition, the fellow will be actively involved in post-procedure management (bleeding, groin complications, acute vessel closure, etc.), and in patient education, including risk factor modification and discharge planning.

Throughout the year, the fellow will be involved as secondary or primary operator (under supervision) in approximately 1000-2000 interventions. This will include cerebrovascular interventions, peripheral interventions (including balloon angioplasty, stenting, endovascular thoracic aneurysm repair, endovascular abdominal aneurysm repair, renal denervation), and structural interventions (including intracardiac shunt closure, balloon valvuloplasty, percutaneous valve implantation, paravalvular leak closure, and septal ablation of hypertrophic cardiomyopathy). The fellow is expected to perform the critical technical manipulations of the procedure depending on his/her level of training during the year. As new technology is closely tied to interventional cardiology, it is imperative that the fellow be trained in current and expanding uses of existing technology. The fellow will participate in device selection and be appropriately supervised by faculty members during all aspects and components of the educational experience.

The fellow will have specific academic responsibilities. He/she is given the responsibility for learning the intricacies of physiology, pathology and treatment options for carotid, cerebrovascular, peripheral vascular and structural heart disease. This will be approached via a variety of ways: a didactic curriculum, bedside teaching, and presentations to senior physicians and staff.

Carotid and cerebrovascular disease and intervention has many aspects, all of which are an important part of the fellowship experience. The fellow should be aware of the rationale for treating intracranial stenosis, endovascular stroke treatment, and the management for symptomatic and asymptomatic aneurysms. The fellow will work with the
vascular laboratory to learn the noninvasive assessment of intracranial and extracranial cerebrovascular disease. He/she will learn current and evolving techniques of carotid stenting and intervention and become familiar with devices for embolic protection during cerebrovascular interventions and the strengths and limitations of each. In addition, patients with combined cardiac and cerebrovascular disease pose an additional challenge, and will be addressed as well.

Peripheral vascular disease is a diverse field with many aspects. The fellow should understand the rationale for treating claudication and critical limb ischemia. The fellow will work with the vascular laboratory to learn the noninvasive evaluation of peripheral artery disease. Each arterial bed (mesenteric, renal, upper and lower extremity) can present with stenosis and occlusion, which have different responses to balloon angioplasty, atherectomy, and stenting. In addition, the fellow will have extensive experience in the preprocedural planning, intervention, and postprocedural follow-up of patients with thoracic and abdominal aortic aneurysms treated with endovascular repair. Furthermore, the fellow will learn the indications, procedural technique, and postprocedural management of patients with hypertension treated with renal denervation.

The fellowship year also includes training in structural heart disease. The fellow should understand the rationale for treating valvular stenosis, including mitral and aortic balloon valvuloplasty and percutaneous valve replacement and valvular regurgitation as well as paravalvular leaks. The fellow should understand the rationale and efficacy of treatment strategies as well as procedural imaging and device selection. The same applies to closure of congenital intracardiac shunts (patent foramen ovale, atrial septal defect, ventricular septal defect, patent ductus arteriosus), as well as the left atrial appendage in patients with atrial fibrillation.

The fellow will have specific research responsibilities. He/she is expected to pursue one or more projects describing best practices for a disease process or procedural techniques within the field of cerebrovascular, peripheral vascular or structural heart disease. For this purpose, the center has active databases of patients who underwent endovascular aneurysm repair, left atrial appendage closure, renal denervation, carotid intervention, patent foramen ovale and atrial septal defect closure, and paravalvular leak closure. The fellow is expected to submit research to a scientific journal and present results at a scientific conference. This will enhance the ability to defend findings in the scientific community, an invaluable skill for tomorrow’s leaders.

Fellowship Feedback:

The trainees will be evaluated by the faculty and director twice a year. The program director will meet with the fellow twice a year to discuss performance. The performance for the fellow will be graded on a 1-10 scale on the following metrics:

a. Patient Care – fellow is able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.

b. Medical Knowledge – fellow demonstrates knowledge about established and evolving biomedical, clinical and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.

c. Procedural Skills – fellow is able to perform interventional procedures competently, commensurate with level of training.
d. Practice-Based Learning and Improvement – fellow is able to investigate and evaluate patient care practices, appraise and assimilate scientific evidence, and improve patient care practices.

e. Interpersonal and Communication Skills – fellow is able to demonstrate interpersonal communication skills that result in effective patient education and information exchange between team members.

f. Professionalism – fellow demonstrates a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to diverse patient populations.

g. System-Based Learning – fellow demonstrates an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value.

h. Research – fellow demonstrates an active commitment to research, with description of best practices and center experience in treatment of various disease processes or procedural techniques.

Fellowship Duration

The minimum is one year. After one year, fellows may apply for a 2nd year.

Requirements and Funding

Candidates have to be board certified in cardiology in their country. They typically already have experience in coronary interventions.

A German license (full license or training license) is a requirement. For most candidates this will not be a problem but the application process may take several months. German language skills are required (currently level B2)

The fellow will have to secure his own funding, for example via his institution or a government program. He/she will have to take care of health and social security insurance.

CVC will cover the liability insurance

Application Process:

Please submit the following information:

1. Application
2. Letters of recommendation from
   a. Chief of Service or Director during fellowship
   b. Two other physicians who are qualified to evaluate your ability and qualifications
3. Copies of official scores from all exams since medical school
4. Curriculum Vitae including experience in cardiology and interventions
5. Photo with application

Qualified candidates will be contacted for an interview.
CardioVascular Center
Advanced Interventional Fellowship in
Cerebrovascular, Structural Heart, and Peripheral Vascular Disease
Application Form

<table>
<thead>
<tr>
<th>Name</th>
<th>____________________________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>____________________________________________</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>____________________________________________</td>
</tr>
<tr>
<td>Email</td>
<td>____________________________________________</td>
</tr>
<tr>
<td>Current Institution</td>
<td>____________________________________________</td>
</tr>
<tr>
<td>Country of Origin</td>
<td>____________________________________________</td>
</tr>
</tbody>
</table>

Training History

Undergraduate
City, State, Country
Degree/Major
Dates attended

Medical School
City, State, Country
Dates attended

Postgraduate Training
Internal Medicine
City, State, Country
Dates attended

Cardiology
City, State, Country
Dates attended
Program Director
Contact Information

Interventional Cardiology
City, State, Country
Dates attended
Program Director
Contact Information