



**ACGME International**

**Advanced Specialty Program Requirements for  
Graduate Medical Education in  
Cardiovascular Disease  
(Internal Medicine)**

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# **ACGME International Advanced Specialty Program Requirements for Graduate Medical Education in Cardiovascular Disease (Internal Medicine)**

## **I Introduction**

### **I.A. Definition and Scope of Specialty**

The adult medicine-based specialty of cardiology concerns disorders of the heart, including prevention, diagnosis, and treatment of coronary artery disease, myocardial disease, heart failure, valvular heart disease, vascular disease, and arrhythmias.

### **I.B. Duration of Education**

- I.B.1. The education program in cardiovascular disease must be 36 or 48 months in length.

## **II Institutions**

### **II.A. Sponsoring Institution**

- II.A.1. A cardiovascular disease fellowship must function as an integral part of an ACGME-I-accredited residency in internal medicine.

### **II.B. Participating Sites**

See International Subspecialty Foundational Requirements, Section I.B.

## **III Program Personnel and Resources**

### **III.A. Program Director**

See International Subspecialty Foundational Requirements, Section II.A.

### **III.B. Faculty**

- III.B.1. Faculty members must teach and supervise fellows in the performance and interpretation of procedures, and this must be documented in each fellow's record, including indications, outcomes, diagnoses, and supervisor(s).

### **III.C. Other Program Personnel**

- III.C.1. Fellows must have regular interaction with electrophysiologists and cardiac surgeons, such as at catheterization conferences and in patient care planning.

### **III.D. Resources**

- III.D.1. A cardiac intensive care unit must be present at the primary clinical site.
- III.D.2. The following laboratory services should be present at the primary clinical site:
  - III.D.2.a) cardiac catheterization laboratories, including cardiac hemodynamics and a full range of interventional cardiology;
  - III.D.2.b) cardiac radiology laboratory, including magnetic resonance imaging (MRI) and computed tomography (CT);
  - III.D.2.c) cardiac radionuclide laboratories;
  - III.D.2.d) echocardiography laboratories, including Doppler and transesophageal echocardiography;
  - III.D.2.e) electrocardiogram (ECG), ambulatory ECG, and exercise testing laboratories;
  - III.D.2.f) electrophysiology laboratories; and,
  - III.D.2.g) a non-invasive vascular laboratory.

### **IV Fellow Appointment**

#### **IV.A. Eligibility Criteria**

- IV.A.1. Prior to appointment in the program, fellows should have completed an ACGME International (ACGME-I)-accredited core specialty program in internal medicine.

#### **IV.B. Number of Fellows**

See International Subspecialty Foundational Requirements, Section III.B.

### **V Specialty-Specific Educational Program**

#### **V.A. Regularly Scheduled Didactic Sessions**

See International Subspecialty Foundational Requirements, Section IV.B.

#### **V.B. Clinical Experiences**

- V.B.1. Fellows must have at least 24 months of clinical experience, including inpatient and special experiences, to include:
  - V.B.1.a) at least four months in the cardiac catheterization laboratory;

- V.B.1.b) at least six months in non-invasive cardiac evaluations, consisting of:
  - V.B.1.b).(1) at least three months of echocardiography and Doppler;
  - V.B.1.b).(2) at least two months of nuclear cardiology, to include each fellow's active participation in a minimum of 80 hours of daily nuclear cardiology study interpretation during the rotation;
  - V.B.1.b).(3) at least one month of experiences in other non-invasive cardiac evaluations, to include exercise stress testing, ECG interpretation, and ambulatory ECG monitoring (continuous and event recording). These rotations may be done concurrently with other rotations; and,
  - V.B.1.b).(4) experience in cardiac tomography, positron emission tomography (PET), cardiac magnetic resonance imaging (CMRI), and peripheral vascular imaging. These rotations may be done concurrently with other rotations.
- V.B.1.c) at least two months devoted to electrophysiology; and,
- V.B.1.d) at least nine months of non-laboratory clinical practice activities, including consultations, cardiac care units, post-operative care, and experience in congenital heart disease, preventive cardiology, and vascular medicine.
- V.B.2. Fellows must participate in training using simulation.
- V.B.3. Fellows must have formal instruction in and clinical experience with performance of the following procedural and technical skills:
  - V.B.3.a).(1) conscious sedation;
  - V.B.3.a).(2) intra-aortic balloon counterpulsation;
  - V.B.3.a).(3) intra-cardiac electrophysiologic studies;
  - V.B.3.a).(4) MRI;
  - V.B.3.a).(5) percutaneous transluminal coronary angioplasty and other interventional procedures;
  - V.B.3.a).(6) pericardiocentesis;
  - V.B.3.a).(7) placement and management of temporary pacemakers, including transvenous and transcutaneous; and,

- V.B.3.a).(8) programming and follow-up surveillance of permanent pacemakers and implantable cardioverter-defibrillators (ICDs).
- V.B.4. Each fellow must perform 10 direct cardioversions or defibrillations.
- V.B.5. Each fellow must perform a minimum of 75 echocardiogram studies, must interpret a minimum of 150 of them, and must observe the performance and interpretation of transesophageal cardiac studies.
- V.B.6. Each fellow must perform a minimum of 50 stress ECG tests (exercise stress testing).
- V.B.7. Each fellow must perform right and left heart catheterization, including coronary arteriography, with participation in a minimum of 100 catheterizations.
- V.B.8. Fellows must have experience interpreting:
  - V.B.8.a) ambulatory ECG recordings;
  - V.B.8.b) a minimum of 3500 ECGs;
  - V.B.8.c) nuclear cardiology, including a minimum of 100 radionuclide studies per fellow, to include SPECT myocardial perfusion imaging and ventriculograms; and,
  - V.B.8.d) chest x-rays.
- V.B.9. Fellows should have a structured continuity ambulatory clinic experience that exposes them to the breadth and depth of cardiology.
  - V.B.9.a) This experience should include an appropriate distribution of patients of each gender and a diversity of ages.
  - V.B.9.b) This experience should average one half-day each week throughout the educational program.
  - V.B.9.c) Each fellow should, on average, be responsible for four to eight patients during each half-day session.
  - V.B.9.c).(1) Each fellow should, on average, be responsible for no more than eight to 12 patients during each half-day ambulatory session.
  - V.B.9.d) The continuing patient care experience should not be interrupted by more than one month, excluding a fellow's vacation.

**V.C. Fellows' Scholarly Activities**

See International Subspecialty Foundational Requirements, Section III.B.

**V.D. Duty Hour and Work Limitations**

V.D.1. Direct supervision of procedures performed by each fellow must occur until competence has been acquired and documented by the program director.

**VI ACGME-I Competencies**

**VI.A. Patient Care**

Fellows must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Fellows must demonstrate proficiency in:

- VI.A.1. the practice of health promotion, disease prevention, diagnosis, care, and treatment of patients of each gender, from adolescence to old age, during health and all stages of illness;
- VI.A.2. prevention, evaluation, and management of:
  - VI.A.2.a) arrhythmias;
  - VI.A.2.b) acute myocardial infarction and other acute ischemic syndromes;
  - VI.A.2.c) cardiomyopathy;
  - VI.A.2.d) cardiovascular evaluation of patients undergoing non-cardiac surgery;
  - VI.A.2.e) congestive heart failure;
  - VI.A.2.f) coronary heart disease, including:
    - VI.A.2.f).(1) acute coronary syndromes; and,
    - VI.A.2.f).(2) chronic coronary heart disease.
  - VI.A.2.g) diseases of the aorta;
  - VI.A.2.h) heart disease in pregnancy;
  - VI.A.2.i) hypertension;
  - VI.A.2.j) infectious and inflammatory heart disease;
  - VI.A.2.k) lipid disorders and metabolic syndrome;
  - VI.A.2.l) need for end-of-life (palliative) care;

- VI.A.2.m) peripheral vascular disease;
- VI.A.2.n) pericardial disease;
- VI.A.2.o) pulmonary hypertension;
- VI.A.2.p) thromboembolic disorders; and,
- VI.A.2.q) valvular heart disease.
- VI.A.3. direct cardioversion or defibrillation;
- VI.A.4. echocardiography;
- VI.A.5. exercise stress testing (ECG tests);
- VI.A.6. right and left heart catheterization, including coronary arteriography;
- VI.A.7. placement and management of temporary pacemakers, including transvenous and transcutaneous;
- VI.A.8. programming and follow-up surveillance of permanent pacemakers and ICDs; and,
- VI.A.9. the interpretation of:
  - VI.A.9.a) ambulatory ECG recordings;
  - VI.A.9.b) chest x-rays;
  - VI.A.9.c) electrocardiograms; and,
  - VI.A.9.d) nuclear cardiology, including SPECT myocardial perfusion imaging and ventriculograms.

**VI.B. Medical Knowledge**

Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care. Fellows must demonstrate proficiency in knowledge of:

- VI.B.1. the scientific method of problem solving and evidence-based decision making;
- VI.B.2. indications, contraindications, and techniques for, and limitations, complications, and interpretation of results of those diagnostic and therapeutic procedures integral to the discipline, including the appropriate indications for and use of screening tests and procedures;

- VI.B.3. the following content areas of basic science:
  - VI.B.4.a) cardiovascular anatomy;
  - VI.B.4.b) cardiovascular metabolism;
  - VI.B.4.c) cardiovascular pathology;
  - VI.B.4.d) cardiovascular pharmacology, including drug metabolism, adverse effects, indications, the effects on aging, relative costs of therapy, and the effects of non-cardiovascular drugs on cardiovascular function;
  - VI.B.4.e) cardiovascular physiology;
  - VI.B.4.f) genetic causes of cardiovascular disease; and,
  - VI.B.4.g) molecular biology of the cardiovascular system.
- VI.B.4. primary and secondary prevention of cardiovascular disease, including:
  - VI.B.5.a) biostatistics;
  - VI.B.5.b) cardiac rehabilitation;
  - VI.B.5.c) cerebrovascular disease;
  - VI.B.5.d) clinical epidemiology; and,
  - VI.B.5.e) current and emerging risk factors.
- VI.B.5. evaluation and management of patients with:
  - VI.B.6.a) adult congenital heart disease;
  - VI.B.6.b) cardiac trauma;
  - VI.B.6.c) cardiac tumors;
  - VI.B.6.d) cerebrovascular disease; and,
  - VI.B.6.e) geriatric cardiology.

**VI.C. Practice-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.

**VI.D. Interpersonal and Communication Skills**

Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals.

**VI.E. Professionalism**

Fellows must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.

**VI.F. Systems-based Practice**

Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.