

## Program Requirements for Fellowship Education in Cardiovascular Disease

### VIII. Educational Program

**A.** A subspecialty educational program in cardiology must be organized to provide training and supervised experience in the evaluation and management of a wide variety of patients with acute and chronic cardiovascular conditions. The training and experience must be at a sufficient level for the fellow to acquire the competency of a specialist in the field.

**B.** The program must have, at a minimum, the following experiences:

1. The training program must be 3 years in duration.
2. There must be at least 24 months of clinical training, including inpatient and special experiences

a) *A minimum of 12 months must be spent in the following areas:*

- (1) Four months in the cardiac catheterization laboratory;
- (2) Six months in noninvasive cardiac evaluations, consisting of the following
  - (a) three months of echocardiography and Doppler;
  - (b) two months of nuclear cardiology, to include the fellow's active participation in daily nuclear cardiology study interpretation (a minimum of 80 hours) during the rotation; and
  - (c) one month of other noninvasive cardiac evaluations, which includes at least:
    - a) exercise stress testing;
    - b) ECG interpretation;
    - c) ambulatory ECG monitoring; and
    - d) cardiovascular magnetic resonance and other techniques (e.g., electron beam or fast helical computed tomography).
    - e) These rotations may be done in conjunction with other block rotations or concurrently with other clinical rotations.
- (3) Two months devoted to electrophysiology, pacemaker follow-up and ICDs.

b) *Additional Clinical Experience*

There must be at least 9 months of non-laboratory clinical practice activities (eg, consultations, cardiac care units, postoperative care of cardiac surgery patients, congenital heart disease, heart failure/cardiac transplantation, preventive cardiology, and vascular medicine).

### IX. Faculty

The program must provide a minimum of four institutionally-based key clinical faculty members, including the program director. In programs with an approved complement of more than six fellows, a ratio of key clinical faculty to fellows of at least 1:1.5 must be maintained.

### X. Facilities and Resources

In addition to the facilities and resources outlined in the Program Requirements for Fellowship Education in the Subspecialties of Internal Medicine, each of the following must be present at the primary training site:

**A.** Diagnostic Laboratory Services: No additional resources are required.

**B.** Imaging: Cardiac radionuclide laboratories must be available.

**C.** Surgery and Pathology: 1. An active cardiac surgery program. 2. A cardiac surgery intensive care unit.

**D.** Other Facilities, Resources or Support Services:

1. ECG, ambulatory ECG, and exercise testing laboratories;
2. echocardiography laboratories, including Doppler and transesophageal echocardiography;
3. cardiac catheterization laboratories, including cardiac hemodynamics and a full range of interventional cardiology;
4. invasive electrophysiology laboratories (N.B.: These may be located at institutions other than at the primary training site.);
5. coronary intensive care unit;
6. services for placement of pacemakers, implantable cardioverter/defibrillator, and follow-up;
7. pulmonary function laboratories;
8. peripheral vascular laboratories.

**E.** Patient Population: (See Program Requirements for Fellowship Education in the Subspecialties of Internal Medicine)

### XI. Specific Program Content

**A.** Clinical Experience:

1. Fellows must have formal instruction, clinical experience, and must demonstrate competence in the prevention, evaluation and management of both inpatients and outpatients with the following:
  - a) chronic coronary heart disease
  - b) congestive heart failure
  - c) arrhythmias
  - d) acute myocardial infarction and other acute ischemic syndromes
  - e) lipid disorders

- f) hypertension
- g) cardiomyopathy
- h) valvular heart disease
- i) pulmonary heart disease and pulmonary embolism
- j) peripheral vascular disease
- k) infections and inflammatory heart disease
- l) cardiovascular rehabilitation

2. Fellows must have formal instruction and clinical experience in the prevention, evaluation and management of both inpatients and outpatients with the following:

- a) adult congenital heart disease
- b) pericardial disease
- c) cardiovascular trauma

**B. Technical and Other Skills:**

1. Fellows must have formal instruction, clinical experience, and must demonstrate competence in the performance of the following:

- a) elective cardioversion;
- b) insertion and management of temporary pacemakers, including transvenous and transcutaneous;
- c) programming and follow-up surveillance of permanent pacemakers
- d) bedside right heart catheterization;
- e) right and left heart catheterization including coronary arteriography (fellows must participate in a minimum of 100 catheterizations.);
- f) exercise stress testing; fellows must perform a minimum of 50 stress ECG tests;
- g) echocardiography (fellows must perform a minimum of 75 and interpret a minimum of 150 studies, including transesophageal cardiac studies).

2. Fellows must have formal instruction, clinical experience, and demonstrate competence in the interpretation of the following:

- a) chest x-rays;
- b) electrocardiograms; a minimum of 3500 electrocardiograms;
- c) ambulatory ECG recordings; a minimum of 150 ambulatory ECG recordings;
- d) radionuclide studies of myocardial function and perfusion.

3. Fellows must have formal instruction and clinical experience in performing the following:

- a) intracardiac electrophysiologic studies;
- b) intra-aortic balloon counterpulsation;
- c) percutaneous transluminal coronary angioplasty and other interventional procedures;
- d) programming and follow-up surveillance of ICDs;
- e) pericardiocentesis.

**C. Formal Instruction:**

The training program must provide formal instruction for the fellows to acquire knowledge of the following content areas:

1. Basic science, including:

- a) cardiovascular anatomy;
- b) cardiovascular physiology;
- c) cardiovascular metabolism;
- d) molecular biology of the cardiovascular system;
- e) cardiovascular pharmacology, including drug metabolism, adverse effects, indications, the effects on aging, relative costs of therapy, and the effects of non-cardiovascular drugs upon cardiovascular function;
- f) cardiovascular pathology;
- g) genetic causes of cardiovascular disease.

2. Prevention of cardiovascular disease, including:

- a) epidemiology and biostatistics;
- b) risk factors;
- c) lipid disorders.

3. Evaluation and management of patients with:

- a) cerebrovascular disease;
- b) heart disease in pregnancy.

4. Management of:

- a) preoperative and postoperative patients;
- b) cardiac transplant patients;
- c) geriatric patients with cardiovascular disease.

5. Diagnostic techniques, including:

- a) magnetic resonance imaging;
- b) fast computed tomography;
- c) positron emission tomography.