

# COCATS 4 Introduction



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## 1. EVOLUTION OF TRAINING RECOMMENDATIONS FOR SPECIALISTS IN ADULT CARDIOVASCULAR MEDICINE

Recommendations for training in adult cardiovascular medicine were first published in the *Journal* in 1995 as a consensus statement emanating from the Core Cardiology Training Symposium (COCATS) held at Heart House in Bethesda, Maryland, the previous year (1). The term “COCATS” has since been used when referring to the American College of Cardiology (ACC) curriculum recommendations for fellowship programs and has come to designate the Core Cardiology Training Statement (rather than the symposium). The 1995 recommendations were contained in 10 Task Force reports covering overall training in clinical cardiology and specialized areas of cardiovascular medicine. As advances in cardiovascular science and technology evolved, training recommendations were revised extensively in 2002 and published as “COCATS 2” (2). In that iteration, the 10 original Task Force reports were updated and additional reports were developed that addressed training recommendations in the areas of vascular medicine, catheter-based peripheral vascular interventions, and cardiovascular magnetic resonance imaging. Subsequent evolution necessitated further revisions, and training recommendations for cardiac electrophysiology and cardiac computed tomography were first published in 2006 as an update to COCATS 2 (3) and then as a full revision (COCATS 3) in 2008 (4). As in previous COCATS documents, the terms “fellow” and “trainee” are used interchangeably, as are “cardiovascular medicine” and “cardiology.”

## 2. OVERSIGHT OF POSTGRADUATE EDUCATION FOR SPECIALISTS IN CARDIOVASCULAR MEDICINE

Regulatory oversight of training in internal medicine and its subspecialties is provided by the Accreditation

Council for Graduate Medical Education (ACGME) and its Internal Medicine Residency Review Committee. The ACGME establishes both common and subspecialty-specific program requirements regarding training duration, institutional infrastructure, faculty leadership and clinician educators, and training environment and safety, as well as the minimum requirements for program content. Whereas the ACGME accredits training programs, the American Board of Internal Medicine (ABIM) certifies individuals as specialists in cardiovascular disease. Successful completion of training in a program with ACGME accreditation is a requirement to sit for the ABIM Cardiovascular Disease certifying examination. Although the ACGME, ABIM, and ACC represent independent organizations, their alignment on training standards is important, and COCATS has been an important contributor to the development of the training requirements for cardiovascular disease. COCATS provides additional curricular content detail beyond the ACGME minimum requirements for general cardiovascular disease to define progressive levels of skill and competency in designated areas.

Over the past several years, there has been a progressive move toward competency-based training, the key characteristic of which is evaluation focused on specific learner outcomes. The central requirements of such training are to delineate the specific components of competency within the subspecialty, define the tools necessary to assess training, and establish milestones that should be met as fellows progress toward independence. This evolution is manifested in COCATS 4, including the overarching 6-domain structure (Table 1) promulgated by the ACGME/American Board of Medical Specialties (ABMS) and endorsed by the ABIM (5).

These competencies should be interpreted, developed, and evaluated in the context of subspecialty training, recognizing that more basic competencies in these domains will or should have been acquired during residency training in internal medicine, a prerequisite for cardiovascular fellowship. Furthermore, maintenance of core competencies over the course of one’s professional career is as important as initial competency acquisition.

**TABLE 1** ACGME Core Competencies

- **Patient Care** that is compassionate, appropriate, and effective for treating health problems and promoting health.
- **Medical 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.
- **Practice-Based Learning and Improvement** that involve investigation and evaluation of a fellow's patient care, self-appraisal, and assimilation of scientific evidence, and improvements in patient care.
- **Interpersonal and Communication Skills** that result in effective information exchange and teaming with patients, their families, and other health professionals.
- **Professionalism** as manifested by a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.
- **Systems-Based Practice** as manifested by actions that demonstrate 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.

These minimum general competencies were endorsed by the ACGME in February 1999 ([www.acgme.org](http://www.acgme.org)), and all Residency Review Committees and Institutional Review Committees were to include this minimum language in their respective Program and Institutional Requirements by June 2001. The definitions are available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3043418/>.

ACGME = Accreditation Council for Graduate Medical Education.

Each COCATS Task Force report that follows covers a specific field of competency in cardiovascular disease, includes curricular content (milestones) within each domain, and lists potential evaluation tools. It is important to emphasize several points regarding the competency tables that accompany each Task Force report. First, each curricular milestone need not be independently evaluated or documented by a formal outcome measure; rather, representative components may be assessed, or in some cases, assessed in aggregate. Second, the curricular milestones underpin the more global ACGME/ABIM reporting milestones (6); the ACC will also provide tools to facilitate mapping of the relevant curricular competencies that support achievement of the more global ACGME/ABIM reporting milestones. This is intended to help training program directors respond to this reporting requirement. Third, the 12-, 24-, and 36-month designations that appear in each competency table are intended as a roadmap for a typical fellow, helping evaluators determine whether an individual fellow is progressing on-track toward independent competency. Training programs vary widely in their sequencing of educational experiences, and fellows vary in the pace at which they achieve competency. The time estimates are simply examples and may, therefore, not apply to all programs or trainees. Variability is expected and acceptable, as long as programs provide mechanisms to assess the development of key competencies over time. A [supplement](#) to this document gathers all of the tables in a compendium.

The aggregated competencies described in COCATS 4 form the basis for the overarching Entrustable Professional Activities (EPAs) of our profession, namely, those activities that patients and the public expect all competent clinical cardiologists to be able to perform (Table 2).

**TABLE 2** Entrustable Professional Activities for Subspecialists in Cardiovascular Disease

- **Cardiovascular Consultation**—evaluate, diagnose, and develop treatment plans for patients with known, with suspected, or at risk of developing cardiovascular disease.
- **Acute Cardiac Care**—manage patients with acute cardiac conditions.
- **Chronic Cardiovascular Disease Management**—manage patients with chronic cardiovascular diseases.
- **Cardiovascular Testing**—appropriately utilize cardiovascular testing.
- **Disease Prevention and Risk Factor Control**—implement disease prevention and risk factor control measures, addressing comorbidities.
- **Team-Based Care**—work effectively to promote patient-centered interdisciplinary team-based care.
- **Lifelong Learning**—engage in lifelong learning.

Some human resource professionals draw a distinction between the terms “competence” and “competency,” using “competence” to describe the actions necessary to perform a function optimally (concerned with effect and output rather than effort and input), and “competency” to describe the behaviors that lie behind optimum performance, such as critical thinking and analytical skills (describing what individuals bring to the profession). Because performance requires a combination of behavior, attitude, and action, the 2 terms are used interchangeably in the Task Force reports.

### 3. REVISION OF TRAINING COMPONENTS SINCE EARLIER ITERATIONS OF COCATS

This iteration of COCATS contains a number of structural changes in the cardiovascular curriculum since the recommendations issued in 2008. There is a substantially stronger focus on ambulatory, consultative, and longitudinal care, reflecting a commitment to patient-centric education in clinical cardiology. The intent is for training of the cardiologist as a consultant with a longitudinal commitment to the care of the patient to be pervasive throughout the 3-year general cardiology fellowship. The curriculum also includes a requirement that continuity clinics be integrated with service rotations in specialized fields such as heart failure, congenital heart disease, geriatric cardiology, and arrhythmias to encompass training in this context.

Two Task Force reports address areas of training not covered in previous editions of COCATS: critical care cardiology and multimodality noninvasive cardiovascular imaging, although the latter was addressed as a separate publication in 2009 (7). A third report expands considerably on the pursuit of research and scholarly activity during fellowship training. This revision emphasizes the importance of active participation in research and scholarly activities and outlines a variety of approaches and formats to meet this important academic requirement for cardiology trainees in the context of a commitment to lifelong learning.

This revision of COCATS incorporates the training recommendations for the 4 basic noninvasive imaging modalities—echocardiography (Task Force 5), nuclear cardiology (Task Force 6), cardiac computed tomography (Task Force 7), and cardiovascular magnetic resonance (Task Force 8)—which are introduced in a new section on multimodality imaging (Task Force 4). Each was written by an individual writing group and represents a revision of a previously published document, except for multimodality imaging, which includes the chairs of the Task Forces for each component imaging modality and experts in multimodality imaging. In the previous training paradigm, fellows often rotated through these laboratories as individual silos of imaging technologies, with individual conferences and separate didactic teaching offerings attached to each modality. The 2008 Training Statement on Multimodality Noninvasive Cardiovascular Imaging indicated that novel methods of training (e.g., allowing concurrent training and consolidating curricula among modalities) could allow fellows to develop higher-level expertise in more than 1 modality in a 3-year fellowship (7). It is increasingly important to utilize multimodality imaging principles in conferences and didactic sessions and to critically discuss the benefits and limitations of various imaging techniques for a given clinical indication.

As described in the echocardiography (Task Force 5) report, competence in both transesophageal echocardiography and contrast echocardiography is necessary to achieve Level II training (defined in Section 5); basic competence in stress echocardiography can be achieved in Level II training. Additional training beyond Level II is recommended for full competence and independence in advanced echocardiography.

The need for core training in procedural techniques, such as electrocardiography, ambulatory monitoring, and conventional exercise stress testing, is clearly defined, with the expectation that trainees will develop increasing sophistication in the application of these techniques over the course of the 36-month fellowship. Training in interventional cardiology as described in the Task Force 10 report is limited to formal training programs in the United States that satisfy the basic standards developed by the ACGME and are accredited by the ACGME. This Level III training must be achieved during a fourth year of dedicated fellowship experience.

The Task Force 11 report indicates more specific procedural time and case volume to gain expertise in cardiac implantable electronic device management. Training in heart failure and transplantation as outlined in the Task Force 12 report has been revised relative to the 1995 and 2002 reports. Level III training in heart failure acknowledges the requirements of the United Network

for Organ Sharing for heart transplant physicians. Level III heart failure training will require at least 1 additional year of training in advanced heart failure and transplantation.

#### 4. MIGRATION TO A COMPETENCY-BASED CURRICULUM

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COCATS 4 utilizes the 6 general competency domains promulgated by the ACGME/ABMS (Table 1) to define the core competencies in clinical cardiology, and structures the curriculum for training to achieve them. The ACC has also adopted this format for its competency and training statements, career milestones, lifelong learning, and educational programs and has developed tools to assist physicians in assessing, enhancing, and documenting competencies.

Each Task Force report includes a table delineating the competency domains and associated curricular milestones for training. The milestones are categorized into Level I, II, and III training (defined in the following text) and indicate the stage of fellowship training (12, 24, or 36 months, and additional time points) by which the typical trainee should achieve the designated level of competence. The tables also describe potential evaluation tools for assessing competence in each domain. Level I competencies may be achieved at earlier or later time points. Although these tables delineate key competency components, they are not comprehensive, and the full spectrum of competency components required of Level I-trained cardiologists is embodied in the Task Force reports that together delineate the training requirements and scope of curriculum.

It is vital to the excellence of a training program that faculty help trainees develop clinical skills and supervise, guide, and critique performance and interpretation of procedures. Although the Task Force reports provide, in some cases, minimum numbers of procedures that should be completed with acceptable outcomes to achieve levels of training, performance and interpretation of a given number of procedures is neither synonymous with satisfactory completion nor sufficient to define adequate training. The numbers of procedures performed and/or interpreted have been developed to be consistent with volume recommendations found in the ACC/American Heart Association practice guidelines, ACC/American Heart Association /American College of Physicians clinical competence statements, expert consensus statements, and other relevant consensus documents, when available; however, the specified volumes of tests or procedures performed and/or interpreted successfully to achieve competence are intended as general guidance based on the educational needs and progress of typical trainees. When duration of exposure or volume of

procedures or cases has been suggested, specified numbers should be considered approximate. The objectives are to ensure exposure to a sufficient breadth of clinical material and pathology and to provide faculty sufficient opportunity to evaluate competency in a given area. Similarly, approximate time frames are guides to facilitate scheduling, reflecting the periods required by the typical trainee to gain requisite knowledge, skills, and experience in each subdiscipline. Given the complexity and time constraints of training programs, many of the requirements in time and case numbers in various procedures may be satisfied concurrently. Examples include training in stress testing during rotations in echocardiography or nuclear cardiology, and experience in cardiovascular magnetic resonance or cardiac computed tomography interpretation during other imaging rotations.

## 5. STRUCTURE AND LEVELS OF TRAINING

The ABIM subspecialty board on cardiovascular disease requires 3 years of cardiology fellowship training. Additional training beyond the standard 3-year general cardiology fellowship is required to sit for certification examinations in clinical cardiac electrophysiology, interventional cardiology, advanced heart failure and transplant cardiology, and adult congenital heart disease. As outlined in this document, additional years of training are also recommended for trainees who desire advanced expertise in specialized areas, those who want dedicated time for basic and/or clinical research training, or both. In this revision of COCATS, recommendations for such advanced training experiences are proposed relative to the discipline of cardiovascular medicine being addressed.

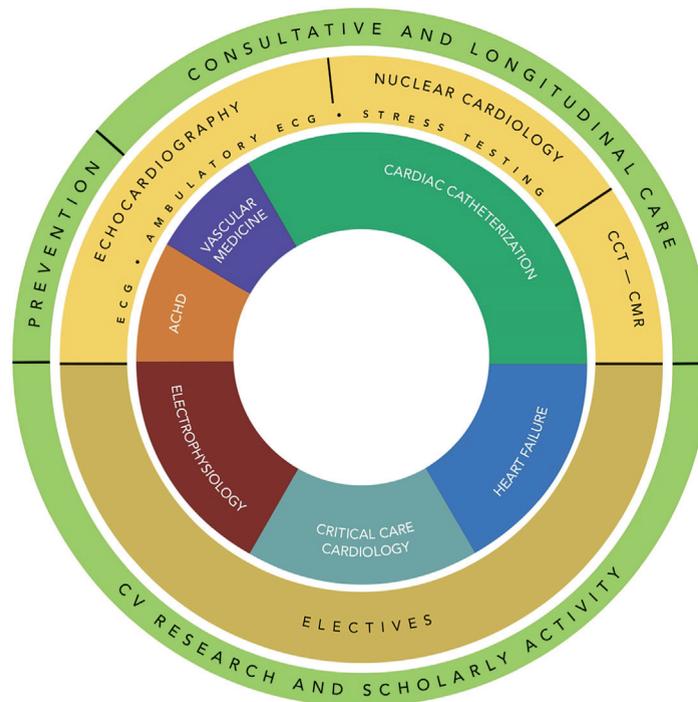
Throughout the Task Force reports, training is defined in terms of the following levels:

- **Level I**—The basic training required of all trainees to be competent consultant cardiologists. This can be accomplished during a standard 3-year training program in general cardiology.
- **Level II**—This refers to the additional training in 1 or more areas that enables some cardiologists to perform or interpret specific diagnostic tests and procedures or render more specialized care for specific patients and conditions. This level of training is recognized only for those areas in which a nationally accepted instrument or benchmark, such as a qualifying examination, is available to measure specific knowledge, skills, or competence. Level II training may be achieved by some trainees in selected areas during the standard 3-year general cardiology fellowship, depending on the trainee's career goals and use of elective periods.

- **Level III**—This level of training requires additional experience beyond the general cardiology fellowship to acquire specialized knowledge and competencies in performing, interpreting, and training others to perform specific procedures or for the trainee to render advanced, specialized care at a high level of skill. Level III training cannot generally be obtained during the standard 3-year general cardiology fellowship and requires additional exposure in a program that meets requirements delineated in Advanced Training Statements (formerly in Clinical Competence Statements) and developed for each specialized field of endeavor. Advanced (Level III) trained faculty should be available to participate in training Level I fellows in cardiac catheterization, interventional cardiology, and cardiac electrophysiology, but are not required for Level I training in other fields.

The emphasis of COCATS is on Level I training—delineating competencies that all cardiology fellows must acquire during the standard fellowship that follows residency training in internal medicine. Level II training is defined for fields in which specific competencies can be undertaken during about 6 months of the 3-year training period (depending upon the career focus of trainees) and measured by a standardized qualifying instrument such as a subspecialty examination. Level II training is not available or described for fields lacking this criterion. Level III training is described only in broad terms to provide context for trainees and clarify that these advanced competencies are not covered during the general cardiology fellowship and require an additional period of training and designation by an independent certification board, often coupled with a certifying examination. The advanced training requirements required to achieve Level III competency will be addressed in subsequent, separately published clinical competence and advanced training statements. The Steering Committee and Task Forces recognize that implementation of these changes in training requirements will occur incrementally over time.

A summary of the various clinical rotations is depicted conceptually in [Figure 1](#). It is important to emphasize that the intent of this diagram is to illustrate relationships among and potential overlaps across the various clinical and educational experiences during fellowship training rather than the specific sequence or duration of rotations. Trainees vary with respect to the length of time spent in each area of study based upon prior experience, aptitude, career goals, and interests. Training in cardiovascular medicine involves the acquisition of specialized skills and capabilities in specific technologies as well as experiences in longitudinal care and scholarly activity that are pervasive across virtually the entire fellowship period.

**FIGURE 1** The COCATS Curriculum for Level I Training in Cardiovascular Medicine

This schematic summarizes the components of training during the standard 3-year cardiovascular fellowship. The various clinical rotations are depicted in a conceptual format to illustrate relationships and potential overlap across the various educational experiences rather than the sequence or duration of rotations. Basic experiences in the acute hospital setting typically occur mainly during the first 24 months, although in some cases, some experiences may be deferred to the third year. Exposure to noninvasive diagnostic testing modalities typically occurs at various points throughout the fellowship as trainees develop the ability to integrate the information generated by these modalities into patient care with increasing sophistication. The outer ring of the diagram denotes longitudinal experiences that pervade the entire fellowship training period. These include consultative, ambulatory, and longitudinal patient care and integration of disease prevention strategies into patient management. Proportionate time frames indicated for each experience represent those required by the typical fellow to acquire the required competencies but should be considered approximate. Depending on available resources and particular characteristics of some training programs and the background, skills, and career goals of individual trainees, it may be possible to combine certain components of training or to develop certain competencies concurrently with others. Elective time may be devoted to additional training in 1 or more areas selected on the basis of the individual trainee's needs and career goals. This additional exposure will enable some trainees to gain Level II competence to perform or interpret certain procedures or render more specialized care for specific patients and conditions. Time allocated to research and scholarly activity may be scheduled continuously or at specific points in the 36-month fellowship depending on the trainee's prior experience, rate of progress, and professional objectives. ACHD = adult congenital heart disease; CCT = cardiovascular computed tomography; CMR = cardiovascular magnetic resonance; CV = cardiovascular; ECG = electrocardiography.

For the typical fellow, approximately half of a year during the standard 3-year fellowship could be allocated to pursuits aligned with the individual's choice for subsequent advanced training. The individual Task Force reports that include sections on Level III training provide information about ancillary fields upon which fellows may choose to focus during general cardiology training to better prepare them for advanced training in their area of interest.

The rapid evolution of cardiovascular science and cardiovascular medicine requires that all training programs have an experienced faculty, adequate facilities, and a rich assortment of didactic offerings for fellows. Specific

components are addressed in each Task Force report. Case-based conferences are vital to train fellows and develop their skills in evidence-based decision making. Self-learning is emphasized, and Internet-based, online educational programs, many of which are interactive, play an increasingly important role in learning during fellowship and beyond. Such didactic activities are outlined throughout the Task Force reports. In most clinical rotations, emphasis should be placed on evidence-based practice guideline recommendations, standards for recording clinical data, and appropriate use criteria for diagnostic and therapeutic procedures.

The COCATS Steering Committee, Task Force chairs and members, and ACC recognize the need to assist trainees, faculty, and program directors with the transition from the historical curriculum that was based on exposure time and case volume to the current competency-based model. Also recognized is the related need for faculty development tools to facilitate the assessment of competency among fellows in training. The developers of COCATS are additionally aware of other challenges facing fellowship programs during this transitional period related to ACGME/ABIM milestone reporting requirements, and the writing groups allow for flexibility in implementation as long as the emphasis on competency-based learning is preserved.

## **6. EVALUATION OF COMPETENCY AND REPORTING OF EDUCATIONAL MILESTONES**

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A key characteristic of competency- and curricular milestone-based training is integration with outcomes-based evaluations. Evaluation of competence is an integral, continuous, and critical part of the educational process for the cardiology fellow across the spectrum of training. Evaluation tools include a variety of modalities, such as direct observation by instructors, in-training examinations, procedure logbooks, conference and case presentations, multisource evaluations, trainee portfolios, simulation, and self-reflection. Case management, judgment, and interpretive and technical skills must be evaluated regularly in every trainee and discussed with the trainee at least twice annually. Quality of care and follow-up; reliability; judgment, decisions, or actions that result in complications; interaction with other physicians, patients, and laboratory support staff; initiative; and the ability to make appropriate independent decisions should be considered.

The ACGME distinguishes levels of advancement in each of the general competencies using milestones that describe a developmental progression from early learner status through advancing or improving competency, readiness for unsupervised practice, and at the pinnacle, aspirational achievement by learners. The program must develop an evaluation system that accurately determines each fellow's progression along this developmental continuum. Mechanisms should be incorporated so that fellows who perform sub-optimally or who exhibit critical deficiencies can be counseled and provided with opportunities for corrective action. Likewise, fellows who are progressing appropriately should be challenged to excel. With the curricular competency milestones, the ACC provides a schema for evaluating the trainee's progressive competency development over the course of the training program. This curricular milestone framework facilitates

specific feedback to trainees as they progress through training.

As much as possible, methods for evaluation and documentation of competence have been standardized across the various Task Force reports. An optimum training environment includes bidirectional evaluations, in which faculty evaluate and provide positive or negative feedback to trainees and trainees evaluate faculty. The program director should review these evaluations with the trainee and faculty individually and collectively at group meetings with both fellows and faculty to address the curriculum and training environment. Fellows and faculty should be formally evaluated after each rotation; timely evaluations better enable trainees to process and incorporate feedback into their learning objectives. By using a competency- and curricular milestone-based framework, the ACC has identified specific observable behaviors that, ideally, are easier to evaluate. In addition to easing evaluation, this format should also aid in providing more specific feedback to trainees as they progress through multiple levels of training.

Evaluation may be accomplished using a variety of modalities on a daily basis. It should include the aforementioned tools, but may also include other innovative evaluation methods as available. Overall clinical progress and deficiencies should also be assessed for each trainee at least twice annually by the training program's Clinical Competency Committee and reported with recommendations to the cardiology fellowship program director. Evaluations are ultimately the responsibility of the fellowship program director and should be performed at least twice annually for each fellow using a variety of evaluation tools.

## **7. COMPOSITION OF THE TASK FORCES AND INTEGRATION OF TRAINING RECOMMENDATIONS**

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As knowledge in cardiovascular medicine continues to expand, training must keep pace. This report represents a consensus and was created using the overall format of the previous COCATS documents. Individual task forces were empaneled to address each component of training in cardiology and structured similarly to include the following members: representatives of the ACC and key cardiovascular subspecialty organizations for a given field of study, a cardiovascular training program director who is not a subspecialist in the subject of the particular report, a training program director in the particular field, an early-career cardiologist practicing in the field who has completed fellowship training within 5 to 8 years, experienced specialists practicing in both academic and community-based practice settings, and physicians experienced in developing and applying

training standards according to the core competencies structure promulgated by the ACGME/ABMS.

The writing groups reviewed the 2008 COCATS 3 Task Force reports and made revisions, additions, and deletions based on published data and expert opinion. Major changes in curricular content most often related to evolution of subspecialty areas in cardiology and widespread acceptance of emerging technologies in clinical practice. Collectively, the Task Force reports reflect a broad effort to establish consistent training criteria across all aspects of cardiology.

## 8. DOCUMENT REVIEW AND ENDORSEMENT

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COCATS 4 was reviewed by 55 external peer reviewers, culminating in over 900 comments that were addressed by authors. The entire document was peer reviewed by the ACC Competency Management Committee, the Cardiology Training and Workforce Committee, and a member of the ACC Board of Trustees and the ACC Board of Governors. A member of the ACC Competency Management Committee served as lead reviewer to ensure a fair and balanced peer review resolution process. Individual Task Force reports were reviewed by the following ACC councils: Task Force 2 report: Prevention of Cardiovascular Disease Section Leadership Council; Task Force 3 and 11 reports: Electrophysiology Section Leadership Council; Task Force 4 to 8 reports: Imaging Section Leadership Council; Task Force 9 report: Peripheral Vascular Disease Section Leadership Council; Task Force 10 report: Interventional Section Leadership Council; Task Force 12 report: Heart Failure and Transplant Section Leadership Council; and Task Force 15 report: Academic Cardiology Section Leadership Council. Representatives from several organizations also reviewed the document: Introduction and Task Force 1 and 9 reports: the ABIM; Task Force 5 report: the American Society of Echocardiography; Task Force 6 and 7 reports: the American Society of Nuclear Cardiology; Task Force 7 report: the Society of Cardiovascular Computed Tomography and the Society of Atherosclerosis Imaging and Prevention; Task Force 7, 9, and 10 reports: the Society for Cardiovascular Angiography and Interventions; Task Force 8 report: the Society for Cardiovascular Magnetic Resonance; Task Force 9 report: the Society for Vascular Medicine; Task Force 11 report: the Heart Rhythm Society; and Task Force 12 report: the Heart Failure Society of America. The American Heart Association reviewed the entire document. All reviewers and their affiliations in the review process and employment information can be found in the appendix containing peer reviewer disclosure information in each report.

Following peer review, the revised document was posted for public comment from December 20, 2014, to January 6, 2015, resulting in 34 additional comments from an array of reviewers from both the community-based and academic practice settings, cardiovascular training program directors, sub-subspecialty training program directors, early-career professionals (in practice <8 years), fellows in training, and government employees. The authors addressed these comments to finalize the document.

All individual COCATS reports were approved by the respective Task Forces, the COCATS Steering Committee, and the ACC Competency Management Committee and were subsequently ratified by the ACC Board of Trustees. Endorsement by participating societies is reflected in each Task Force report. This document is considered current until the ACC Competency Management Committee revises or withdraws it.

## 9. AUTHOR AFFILIATIONS

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The Steering Committee is grateful for the time and effort devoted to this COCATS revision by the Task Force members and reviewers who provided valuable input. Staff of the American College of Cardiology provided superb support to the COCATS 4 effort, and their contributions are recognized with appreciation.

The ACC determined that relationships with industry or other entities were not relevant to the creation of this general cardiology training statement; however, employment and affiliation information for authors and peer reviewers are provided in [Appendixes 1 and 2](#), respectively, along with disclosure reporting categories. Comprehensive disclosure information for all authors, including relationships with industry and other entities, is available as an [online supplement](#) to this document.

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**REFERENCES**

1. American College of Cardiology. COCATS guidelines for training in adult cardiovascular medicine: Core Cardiology Training Symposium. June 27-28, 1994. *J Am Coll Cardiol* 1995;25:1-34.
2. Beller GA, Bonow RO, Fuster V. ACC revised recommendations for training in adult cardiovascular medicine: core cardiology training II (COCATS 2)—revision of the 1995 COCATS training statement. *J Am Coll Cardiol* 2002;39:1242-6.
3. Beller GA, Bonow RO, Fuster V. ACCF 2006 update for training in adult cardiovascular medicine (focused update of the 2002 COCATS 2 Training Statement): a report of the American College of Cardiology Foundation/American Heart Association/American College of Physicians Task Force on Clinical Competence and Training. Introduction. *J Am Coll Cardiol* 2006;47:894-7.
4. Beller GA, Bonow RO, Fuster V. ACCF 2008 recommendations for training in adult cardiovascular medicine core cardiology training (COCATS 3)—revision of the 2002 COCATS training statement. *J Am Coll Cardiol* 2008;51:335-8.
5. Nasca TJ, Philibert I, Brigham T, Flynn TC. The next GME accreditation system: rationale and benefits. *N Engl J Med* 2012;366:1051-6.
6. Gitlin S, Flaherty J, Arrighi J, et al. The Internal Medicine Subspecialty Milestones Project: a joint initiative of the Accreditation Council for Graduate Medical Education and the American Board of Internal Medicine in collaboration with the Alliance for Academic Internal Medicine. Available at: <http://www.acgme.org/acgmeweb/Portals/0/PDFs/Milestones/InternalMedicineSubspecialtyMilestones.pdf>. Accessed February 25, 2015.
7. Thomas JD, Zoghbi WA, Beller GA, et al. ACCF 2008 training statement on multimodality noninvasive cardiovascular imaging: a report of the American College of Cardiology Foundation/American Heart Association/American College of Physicians Task Force on Clinical Competence and Training. *J Am Coll Cardiol* 2009;53:125-46.

**KEY WORDS** ACC Training Statement, COCATS, fellowship training, clinical competence

**APPENDIX 1. AUTHOR RELATIONSHIPS WITH INDUSTRY AND OTHER ENTITIES (RELEVANT)—COCATS 4 INTRODUCTION**

Committee Member	Employment	Consultant	Speakers Bureau	Ownership/ Partnership/ Principal	Personal Research	Institutional/ Organizational or Other Financial Benefit	Expert Witness
Jonathan L. Halperin	Icahn School of Medicine at Mount Sinai—Professor of Medicine	None	None	None	None	None	None
Eric S. Williams	Indiana University School of Medicine—Professor (Cardiology) and Associate Dean; Indiana University Health—Cardiology Service Line Leader	None	None	None	None	None	None
Valentin Fuster	Icahn School of Medicine at Mount Sinai, Zena and Michael A. Wiener Cardiovascular Institute—Director	None	None	None	None	None	None

For the purpose of developing a general cardiology training statement, the ACC determined that no relationships with industry or other entities were relevant. This table reflects the authors' employment and reporting categories. To ensure complete transparency, authors' comprehensive healthcare-related disclosure information—including relationships with industry not pertinent to this document—is available in an [online data supplement](http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy). Please refer to <http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy> for definitions of disclosure categories, relevance, or additional information about the ACC Disclosure Policy for Writing Committees.

ACC = American College of Cardiology.

**APPENDIX 2. PEER REVIEWER RELATIONSHIPS WITH INDUSTRY AND OTHER ENTITIES (RELEVANT)—  
COCATS 4 INTRODUCTION**

<b>Name</b>	<b>Employment</b>	<b>Representation</b>	<b>Consultant</b>	<b>Speakers Bureau</b>	<b>Ownership/ Partnership/ Principal</b>	<b>Personal Research</b>	<b>Institutional/ Organizational/ or Other Financial Benefit</b>	<b>Expert Witness</b>
Richard Kovacs	Indiana University, Krannert Institute of Cardiology—Q.E. and Sally Russell Professor of Cardiology	Official Reviewer, ACC Board of Trustees	None	None	None	None	None	None
Dhanunjaya Lakkireddy	Kansas University Cardiovascular Research Institute	Official Reviewer, ACC Board of Governors	None	None	None	None	None	None
Howard Weitz	Thomas Jefferson University Hospital—Director, Division of Cardiology; Sidney Kimmel Medical College at Thomas Jefferson University—Professor of Medicine	Official Reviewer, Competency Management Committee Lead Reviewer	None	None	None	None	None	None
Furman McDonald	American Board of Internal Medicine—Vice President Graduate Medical Education, Department of Academic Affairs; Professor, Medicine	Organizational Reviewer, ABIM	None	None	None	None	None	None
Allan Klein	Cleveland Clinic—Professor, Medicine; Director, Pericardial Center	Organizational Reviewer, ASE	None	None	None	None	None	None
Dennis Calnon	OhioHealth Heart and Vascular Physicians—Director, Cardiac Imaging, Riverside Methodist Hospital	Organizational Reviewer, ASNC	None	None	None	None	None	None
Kousik Krishnan	Rush University Medical Center—Associate Professor, Medicine and Pediatrics; Director, Arrhythmia Device Clinic	Organizational Reviewer, Heart Rhythm Society	None	None	None	None	None	None
Richard Patten	Lahey Hospital And Medical Center, Division of Cardiovascular Medicine	Organizational Reviewer, HFSA	None	None	None	None	None	None
John Hodgson	Metrohealth Medical Center	Organizational Reviewer, SCAI	None	None	None	None	None	None
Michael Ragosta	University of Virginia Health System, Cardiovascular Division	Organizational Reviewer, SCAI	None	None	None	None	None	None
Aditya M. Sharma	University of Virginia Health System, Cardiovascular Division—Assistant Professor, Medicine	Organizational Reviewer, SCAI	None	None	None	None	None	None
Kanwar Singh	University of Virginia Health System, Cardiovascular Division	Organizational Reviewer, SCAI	None	None	None	None	None	None
Warren Manning	Beth Israel Deaconess Medical Center, Division of Cardiology—Professor, Medicine and Radiology	Organizational Reviewer, SCMR	None	None	None	None	None	None
Geoffrey Barnes	University of Michigan Frankel Cardiovascular Center, Cardiovascular Medicine and Vascular Medicine	Organizational Reviewer, SVM	None	None	None	None	None	None
Esther S.H. Kim	Cleveland Clinic—Staff Physician, Department of Cardiovascular Medicine	Organizational Reviewer, SVM	None	None	None	None	None	None
Alex Auseon	Ohio State University Medical Center—Assistant Professor, Clinical Medicine, Division of Cardiology	Content Reviewer, Academic Cardiology Section Leadership Council	None	None	None	None	None	None

(continued on the next page)

**APPENDIX 2. CONTINUED**

<b>Name</b>	<b>Employment</b>	<b>Representation</b>	<b>Consultant</b>	<b>Speakers Bureau</b>	<b>Ownership/ Partnership/ Principal</b>	<b>Personal Research</b>	<b>Institutional/ Organizational or Other Financial Benefit</b>	<b>Expert Witness</b>
Kenneth Ellenbogen	VCU Medical Center—Director, Clinical Electrophysiology Laboratory	Content Reviewer, Cardiology Training and Workforce Committee	None	None	None	None	None	None
Michael Emery	Greenville Health System	Content Reviewer, Sports and Exercise Cardiology Section Leadership Council	None	None	None	None	None	None
Bulent Gorenek	Eskisehir Osmangazi University Medical School	Content Reviewer, Electrophysiology Section Leadership Council	None	None	None	None	None	None
Brian D. Hoit	University Hospitals Case Medical Center	Content Reviewer, Cardiology Training and Workforce Committee	None	None	None	None	None	None
Howard M. Julien	Thomas Jefferson University Hospital, Jefferson Health System—Cardiology Fellow in Training	Content Reviewer, Heart Failure and Transplant Section Leadership Council	None	None	None	None	None	None
Andrew Kates	Washington University School of Medicine	Content Reviewer, Academic Cardiology Section Leadership Council	None	None	None	None	None	None
Kristen Patton	University of Washington	Content Reviewer, Electrophysiology Section Leadership Council	None	None	None	None	None	None
Robert Piana	Vanderbilt University Medical Center—Professor, Medicine and Cardiology	Content Reviewer, Interventional Council	None	None	None	None	None	None
Gregory Piazza	Brigham and Women's Hospital/Harvard Medical School, Cardiovascular Division	Content Reviewer, PVD Council	None	None	None	None	None	None
Tanveer Rab	Emory University School of Medicine—Associate Professor, Medicine and Cardiology/ Interventional Cardiology	Content Reviewer, Interventional Council	None	None	None	None	None	None
Arash Sabati	Children's Hospital of Los Angeles	Content Reviewer, ACPC Council	None	None	None	None	None	None
David Vorchheimer	Montefiore-Einstein Center for Heart and Vascular Care—Director, Clinical Cardiology; Professor, Clinical Medicine	Content Reviewer, Individual	None	None	None	None	None	None

For the purpose of developing a general cardiology training statement, the ACC determined that no relationships with industry or other entities were relevant. This table reflects peer reviewers' employment, representation in the review process, as well as reporting categories. Names are listed in alphabetical order within each category of review. Please refer to <http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy> for definitions of disclosure categories, relevance, or additional information about the ACC Disclosure Policy for Writing Committees.

ABIM = American Board of Internal Medicine; ACC = American College of Cardiology; ACPC = Adult Congenital/Pediatric Cardiology; ASE = American Society of Echocardiography; ASNC = American Society of Nuclear Cardiology; HFSA = Heart Failure Society of America; PVD = peripheral vascular disease; SCAI = Society for Cardiovascular Angiography and Interventions; SCMR = Society for Cardiovascular Magnetic Resonance; SVM = Society for Vascular Medicine; VCU = Virginia Commonwealth University.

**APPENDIX 3. ABBREVIATION LIST**

ABIM = American Board of Internal Medicine

ABMS = American Board of Medical Specialties

ACC = American College of Cardiology

ACGME = Accreditation Council for Graduate Medical Education

COCATS = Core Cardiovascular Training Statement