

Training in Multimodality Imaging: Challenges and Opportunities

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Ten years ago, training in multimodality imaging was but a gleam in a cardiologist's eye. But the formulation of new recommendations by the American College of Cardiology Foundation/American Heart Association (AHA)/American College of Physicians Task Force on Clinical Competence and Training in the statement on multimodality noninvasive cardiovascular imaging officially marks the beginning of a new era (1). We have come to this point through a combination of significant refinements in echocardiography and radionuclide techniques, the advent of cardiovascular computed tomography and magnetic resonance imaging, and a deepening appreciation for the complementary roles these imaging modalities play in clinical care. Possessing unique advantages and limitations, the application of a given modality should be dictated by the needs of a particular patient rather than the expertise of a particular cardiologist. It is no surprise, then, that cardiology fellows are increasingly interested in learning and manipulating these technologies themselves—while not wanting to unduly prolong their fellowship in order to accumulate the necessary expertise in a traditional, sequential mode of training.

For example, under the existing COCATS requirements, attaining Level 3 expertise in all 4 imaging modalities would require 42 months if training in each technique took place consecutively (2). Is it possible to maintain a quality of training while creating opportunities to develop expertise in more than 1 modality over the course of a more reasonable 3-year fellowship? The Task Force has answered “yes.” By integrating different imaging mo-

dalities into the fellowship program, it is possible to create a more efficient training environment that still maintains the rigor of the requirements in each modality. Keys to increasing efficiency include creating a unitary basic science curriculum that prepares trainees intellectually for all 4 imaging modalities and decreases duplication of information (e.g., in anatomy and physiology); collocation of some or all of the imaging modalities to allow shared time in training; and taking advantage of digital technologies that enable all the various types of images to share the same platform (1). In fact, it seems likely that altering the fellowship programs in this way will actually *improve* the educational and training experience of our fellows.

It is worth noting that the Task Force's recommendations for exposure to cases and mentor training are very similar to the existing COCATS recommendations. What is new is that all cardiologists must attain at least Level 1 training in each imaging modality: they must understand the basic principles, indications, advantages, and limitations of each modality and its relation to other diagnostic methods. The Task Force also strongly recommends that all fellows achieve at least a *near*-Level 2 competence in echocardiography, while achieving Level 1 training in nuclear cardiology, cardiac computed tomography (CT), and cardiac magnetic resonance (CMR) within the 7 months currently dedicated to noninvasive imaging in the standard 3-year fellowship. Fellows interested in developing further competence and expertise in imaging would require more training to achieve a Level 2 and 3 expertise. The number of cumulative months of training for Levels 1 and 2 also remains the same, but the duration of training for Level 3 would be somewhat shorter depending on the modality. Under the new training proposal, at least one-half of these training months

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would be dedicated solely to 1 imaging modality and the remaining would be shared at a later stage in training with another modality, such as echo-CMR, nuclear-CT, or other paired combinations (1). Some fellows would want to acquire Level 2 training in several modalities while others will want to specialize in 1 or at most 2 modalities to attain mastery of the field, which would conceivably require more dedicated time and research involvement than is possible in 3 years (see below). In our opinion, both types of trainees will play important roles in promoting further developments in imaging research and ensuring good clinical practice.

Given that Level 1 competency in all 4 imaging techniques will now be considered a minimal expectation, and that current fellows aspire to train further in more than 1 imaging modality, fellowship programs that do not have the desired patient volume, variety of cardiovascular pathology, and available access to the 4 imaging modalities to offer the optimum training will face challenges. Some programs would need to collaborate with a radiology training program, other cardiology programs which can provide the requisite volume or expertise, or rely on the American College of Cardiology (ACC) and cardiovascular imaging societies to supplement educational offerings for the early levels for optimum training. All of us, however, will face the same challenge of instilling clinical depth and acuity while broadening the knowledge base that fellows must master. Our best guarantee against training a generation of imaging dilettantes is for mentors to uphold the same rigorous standards with trainees during their rotations that they would under the traditional, single-modality "silo" mode of education. Fellows must actively interpret and collaborate with experts in each modality, not simply view images while reading the imaging reports. We will need the early adapters of this multimodality training approach to provide feedback as to its efficacy so that later versions of COCATS can benefit from their wisdom.

The evolution in imaging training is analogous to what has evolved in interventional cardiology and cardiac electrophysiology: a large and increasingly complex body of knowledge needed to be imbibed if physicians were to keep up with increasingly sophisticated standards of care. Consequently, the ACC and AHA proposed adding a fourth year of fellowship training, culminating in an examination by the cardiovascular board of the American Board of Internal Medicine (ABIM) by which fellows could acquire a Certificate of Added Qualification (CAQ). A similar process has now been approved for training track in heart failure and transplantation. The advanced training path in multimodality cardiovascular imaging, adding a fourth training year, and the possibility of certification, are currently being explored (1).

At present, only a few training programs have been able to establish multimodality cardiovascular imaging training. These programs can boast of an access to several imaging modalities in close proximity, which allows sequential or substitutive testing to be more feasible and much convenient for patients. Faculty and fellows share a large reading room dedicated to interpretation of studies, where concurrent exposure to different modalities helps crystallize the unique strengths and limitations of each. The shared space also promotes broader intellectual exchange between clinicians and researchers seeking a better approach to diagnosis or treatment. It is conceivable that many other creative ways would evolve to address the challenges of preparing the next generation of cardiovascular imaging specialists. Encouraged by all these developments, of one thing we can be sure: this is the dawn of an exciting new era in the field of cardiovascular imaging.

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