# THE METHODIST DEBAKEY CARDIOVASCULAR IMAGING CENTER: A UNIQUE SETTING FOR CLINICAL CARE, TRAINING, AND COLLABORATIVE RESEARCH

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## INTRODUCTION

**The past decade has seen an accelerated evolution of cardiovascular imaging. Not only have the accuracy and resolution of various imaging techniques improved, but our understanding of the different strengths of each technique has deepened with experience. As multimodality imaging emerged as a clinical ideal, The Methodist Hospital found itself superbly situated to make it a clinical reality. The genesis of the Methodist DeBakey Cardiovascular Imaging Center, which fully came into being in January 2008, may contain useful lessons for other institutions interested in developing comprehensive imaging capabilities for the benefit of patients, trainees, physicians, and researchers.**

## A CONDUCIVE SETTING

le is one ching to conceive a mulcimodal imaging operation; planning took us only a few months, beginning in 2005. Bue the charting of our course and subsequent implementation were made immeasurably easier by the support of The Mechodisc Hospital administration and che scrong hiscory of collaboracion between the echocardiography and nuclear cardiology laboratories.

Initially under the directorship of **Dr.** William Winters and lacer under **Dr.** Miguel Quinones, echocardiography at Methodist has been consistently

Cardiovascular imaging employees implement the latest technologies in echocardiography, nuclear, cardiovascular CT, and MRI. Bringing together these technologies has a significant impact on patient care, training and research.


Coronary angiography using computed tomography (CI) showing the heart and the coronary arteries.

excellent, gaining international prominence, a cadre of talented international tcainees, and an equally diverse patient population.

Simultaneously, che nuclear cardiology laboratory - operating within the section of cardiology - was winning similar national and international recognition under the leadership of Dr. Mario Verani. Largely because of the congenial personalities and intense curiosi$_{ty}$ of these directors, collaboracion among the cwo laboratories was exemplary: we used the two techniques concurrently or sequentially in several patient populations to delineate the comparative strengths of these modalities in the diagnosis of coronary artery disease,[1] in risk stratification,2 and to understand the pathogenesis of diseases such as myocardial hibernation.3

We also studied the comparative feasibili$_{ty}$ and accuracy of diagnostic methods of stress echocardiography and nuclear tomography.[1,2] This was caking place at a time when these two methodologies were viewed primarily in a competitive light; laboratories around the country were amazed at the degree of openness and cooperation here at The Methodist Hospital.

With Dr. Verani's passing in 2001, the helm of the nuclear laboratory was taken by the equally collaborative Dr. John Mahmarian, a pioneer in quancitacion of nuclear techniques and in the early cardiac application of CT technology.

In the meantime, advances in CT scanning technology were allowing cardiologists to go beyond merely detecting the presence of coronary calcium to visualizing the coronary vessels. Improvements in cardiovascular magnetic resonance imaging (MRI) have enabled structural imaging, quantitation of valvular disease, evaluation of coronary artery disease with stress testing, and assessment of myocardial viability in patients with ischemic cardiomyopathy. Wanting co capture the potential of these imaging modalities in addition to the conventional echocardiography and nuclear techniques, we set out to form a multifaceted but unifying imaging center by co-locating the various modalities to optimize patient care, training, and research in multimodality imaging. We also wanted to ensure chat staff would have dedicated space to interact, discussing the interpretations of studies by different modalities and stimulating new research ideas.

## THE REALIZATION OF MULTIMODALITY IMAGING

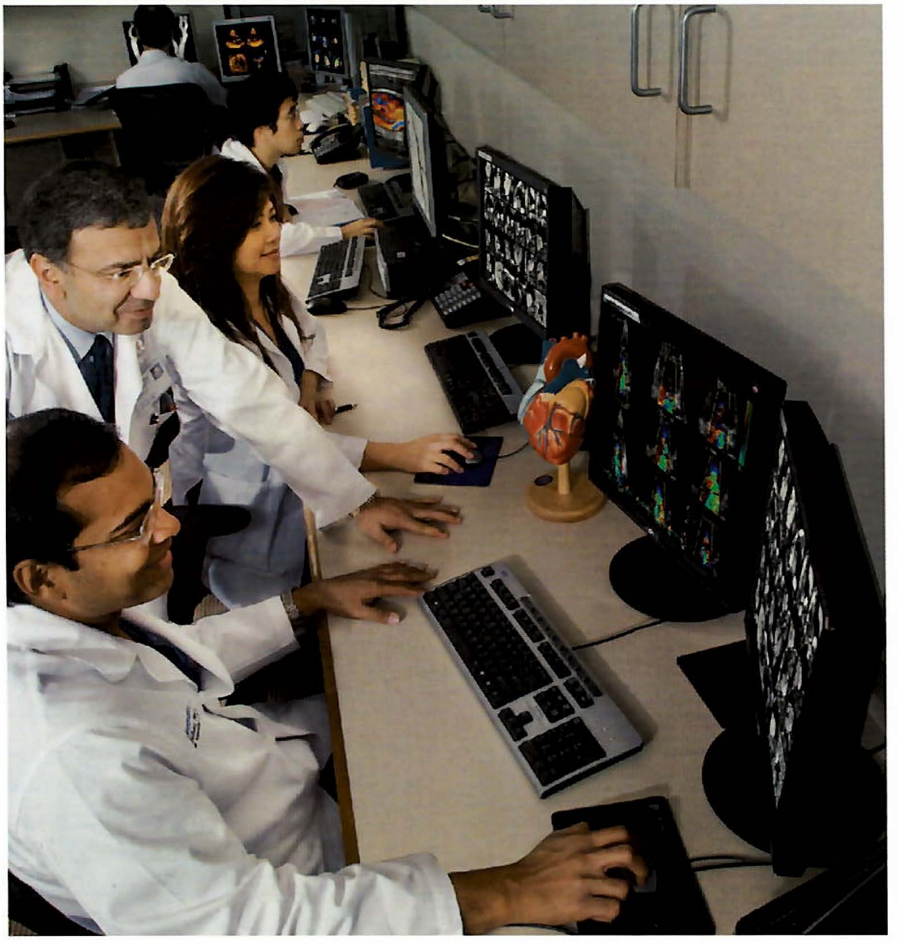
Multimodality imaging at the Methodist DeBakey Heart & Vascular Center became a full-f1edged reality in January 2008, encompassing under one roof the latest imaging technologies - echocardiography, nuclear, cardiovascular CT, and MRI. Dr. Mahmarian heads both the Nuclear Cardiology Laboratory and CT cardiac scanning, and we recruited Dr. Dipan Shah, graduate of Duke Universi$_{ty}$'s MRI program, to head the cardiovascular MRI Unit.

Our equipment is state-of-the-arr, and the facility serves as a center of excellence for the imaging industry to test new hardware or software and refine new technology for its applications to patient care.

This endeavor has had an obvious impact on the quality of care we can offer our patients. Our cardiovascular unit can house all patients scheduled for testing. Managers for all noninvasive testing are in the same facility complex (except for MRI, which is scheduled to be on the same floor in 2011).

This close proximity facilitates coordination of sequential testing, e.g., from echo to nuclear or vascular ultrasound. Furthermore, if a certain test is not ideal for the patient's cardiac condition, we can immediately alter course and change to another, more appropriate srudy with the approval of the referring physician.

Trainees also benefit from a unique environment in which all the different imaging modalities are situated near one another, linked by a centralized "reading room" for interpretation of studies. Faculty and fellows in the various imaging disciplines enjoy this dedicated space for interactions, teaching, and stimulating discussions abour research ideas. Fellows can dedicate time to one modality or simultaneously train in another technique, with greater flexibility and efficiency than they could achieve in a more "balkanized." setting.



Common reading room for multimodality cardiovascular imaging at the Methodist DeBakey Heart & Vascular Center.

Indeed, this vision for training in multimodality imaging has been incorporated imo a recent document about training of cardiology fellows in multimodality noninvasive imaging.4 Contemporaneous training in several technologies can provide tremendous opportunities to learn the intricacies of each method - their comparative advantages and disadvantages - in a robust clinical environment.

This secup reduces the down time that can occur between reading sessions, facilitates sharing of information among experts in the various modalities, and is proving to be fruitful ground for improving diagnostics and performing collaborative research as part of the training experience. Technology supports such efforts by providing work stations that can accommodate multi-platform viewing of cardiovascular images of more than one modality.

Clinical faculty and researchers in various imaging modalities are also enjoying unprecedented levels of interaction. The department cultivates improvements in imaging in several formal and informal ways. First, physicians are close by and thus can exchange interpretive caveats of interesting cases or brainstorm ideas for further research. Second, they can collaborate with one another and with researchers to assess the best approach for diagnosis, treatment, outcome, and cost efficiency using multimodality imaging. Third, interactivity promotes developments in individual technologies such as speckle tracking in echocardiography, new tracers in SPECT imaging, or new pulse

sequences for MRI. The energetic interaccions among all the members of the department have propelled us to start a weekly mulrimodali$_{ry}$ imaging journal club and a weekly imaging research seminar where fellows and researchers present the latest developments in 1magmg modalities and cooperative research.

## CONCLUSION

In closing, I am pleased to report that the Cardiovascular Imaging Center concept is already bearing fruit. The establishment of multimodality cardiovascular imaging under cardiology leadership and guidance supports more efficient training of cardiology fellows, encourages exchanges of ideas for fucure technology development, and allows the practicing physician to review all imaging studies in one setting and interact with imaging specialists to optimize resource utilization and patient management. We have just graduated new multimodaliry imaging fellows who tailored their fellowship training to their own unique interests. Research in mulcimodality imaging is flourishing and ranges from three-dimensional echocardiography, diasrolic function, and imaging the vulnerable plaque with CT angiography to risk stratification in heart failure and sudden death using cardiac MRI. It is our belief that multimodality imaging will lead to more cost-effective and appropriate utilization of imaging in detecting, preventing, and managing cardiovascular disease.

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