



## Preface Vascular imaging



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It has been 7 years since an issue of *Radiologic Clinics of North America* was devoted to vascular imaging. Now, as then, cardiovascular disease remains the leading cause of death and morbidity in the United States; however, in the ensuing 7 years, noninvasive vascular imaging modalities have improved significantly, and there has also been a significant change in their utilization pattern.

Gadolinium-enhanced 3D magnetic resonance angiography (MRA) has matured into a robust and accurate vascular imaging technique. Its use is no longer confined to a few dedicated centers; rather, 3D gadolinium-enhanced MRA is now successfully used in many clinical settings throughout the world and has replaced other diagnostic imaging modalities in a number of vascular territories.

Although it was not considered a primary vascular imaging modality 7 years ago, computed tomography angiography (CTA) has experienced a technological quantum leap forward. The introduction of multislice detector systems with isotropic imaging capabilities has enabled CTA to surpass MRA with regard to spatial resolution. In many centers, CTA is now the modality of choice for the diagnosis of pulmonary embolism and the assessment of diseases of the aorta. The acquisition of CTA data is rapid, and the post-processing algorithms continue to improve, allowing for the use of various fly-through and 3D reconstructions. In addition, in its most recent implementation using an EKG-gated technique, CTA allows for the

acquisition of images of the coronary arteries with resolution and vessel definition surpassing those of coronary MRA.

Another innovation in vascular imaging is the development of both MR and CT for the detection and characterization of atherosclerotic plaque. The ability to define plaque morphology reveals a whole new realm of vascular imaging application. It has become apparent that atherosclerotic plaques are heterogenous, with some being more prone to calcify, rupture, or progress depending on the constitution of the plaque. In addition, by being able to more clearly define a plaque and its morphology, the effect of various therapies on the progression or regression of plaque can be monitored.

Catheter-based angiography is now synonymous with digital subtraction angiography (DSA). Although DSA is used less in the setting of vascular diagnosis, its application in interventional procedures or to reconcile the inconsistencies of noninvasive studies continues. Newer, catheter-based methods have also been developed and refined to add to our armamentarium. 3D rotational angiography and the use of alternative contrast media are two examples of catheter-based techniques that have been developed in the past decade. Nevertheless, there can be no doubt that the role of catheter-based angiography as a diagnostic tool will be further reduced over the next decade given the rapid pace of technological advancements in both CT and MR imaging. In addition, the

field of interventional MRI has progressed to a level that vascular interventions are now feasible in an MR environment and may ultimately challenge fluoroscopically guided techniques.

We hope that this issue of *Radiologic Clinics of North America* provides the reader with a greater understanding of some of the recent developments in the field of vascular imaging and helps to put their potential use and application into a practical clinical context. We would like to thank the authors for their outstanding and timely contributions. Undoubtedly, vascular imaging is an area within the field of cardiovascular medicine that is experiencing rapid growth, and every radiology department should attempt to become intimately involved in its clinical application.

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