**Placing Computed Tomography Coronary Angiography in Perspective**

The study in the *Journal* by Meijboom et al. (1) and the accompanying editorial by Nissen (2) seem disconnected from each other.

The Meijboom et al. (1) study was a diagnostic performance study that aimed to establish the accuracy of the newly introduced technology. This was a well-executed prospective multicenter, multivendor study, the results of which indicate high diagnostic accuracy of computed tomography coronary angiography (CTCA) in symptomatic patients with a high prevalence of coronary artery disease (CAD) that is superior to other methods of noninvasive cardiac testing. Furthermore, despite the high prevalence of significant CAD, the ability of CTCA to exclude obstructive coronary stenosis in the Meijboom et al. (1) study approached 100%, which is higher than that reported for all other forms of noninvasive cardiac testing.

In contrast, the accompanying editorial by Nissen (2) briefly discusses the Meijboom et al. (1) study but concentrated much of its text to describing the history of invasive coronary angiography, stress testing, CTCA, and the need for patient-centered outcomes studies for CTCA.

There are several important observations that are worthy of note:

1. The cart should not be placed before the horse. The first step for assessment of any new diagnostic technology is the establishment of its diagnostic accuracy, and this purpose was well served by the Meijboom et al. (1) study. Indeed, the Meijboom et al. (1) study now joins 2 other prospective multicenter studies (ACCURACY [Assessment by Coronary Computed Tomographic Angiography of Individuals Undergoing Invasive Coronary Angiography] and CORE-64 [Coronary Artery Evaluation Using 64-Row Multidetector Computed Tomography Angiography]) evaluating the accuracy of CTCA (3,4). There have been no large-scale, prospective, multicenter studies of diagnostic accuracy performed for the stress imaging tests that have become the de facto standard of care.

2. “When will we get there?” is a fair question. “Why aren’t we there?” is not. The introduction of CTCA occurred 3 years ago, just enough time to definitively establish diagnostic accuracy. Studies regarding CTCA now need to assess its costs to the health care system and its clinical effectiveness for patients, and these types of trials have been proposed and designed and are being implemented.

3. “Res ipsa loquitur.” Until these trials can be completed, common sense should dictate clinical use of noninvasive cardiac testing. The majority of patients for whom noninvasive cardiac testing is most appropriate will not have significant CAD. As such, a test that can successfully exclude CAD with an accuracy approaching 100% should be employed to identify individuals in which no further need for testing or therapy is necessary.

4. Negative is not necessarily bad. Although it is a complex task to ascribe an economic value to the intangibles of a negative test in a scientific study, it is nevertheless very straightforward to a patient. A “negative test” can be worth as much—if not more—than a “positive test,” because the value of peace of mind to a concerned symptomatic patient is unambiguous: it is priceless.

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**REFERENCES**


**Diagnostic Accuracy of 64-Slice Computed Tomography Coronary Angiography**

**A Flawed Comparison**

We read with interest the recent paper by Meijboom et al. (1) and the corresponding editorial by Nissen (2). We wish to make 3 comments.

First, as with almost all previous validation studies comparing computed tomography coronary angiography (CTCA) with inva-
Coronary mult_detector computed tomography (MDCT) is a relatively recent noninvasive diagnostic modality. The first 4-slice computed tomography (CT) scan was introduced in 1999; since then the technique has undergone rapid technological improvements, with introduction of 64-, 128-, 256-, and 320-slice MDCT scanners that have resulted in better, high-quality coronary images. Coronary CT has an enormous appeal, not only because of the sometimes spectacular and seductive cardiac images—this noninvasive diagnostic modality may potentially be able to replace invasive coronary angiography. This might have led to initial over-enthusiasm that prompted use of this new technique in many clinical situations, although the necessary evidence to support this was lacking.

However, in the meantime, many CT studies have been published, and together with 3 large-sized multicenter studies it has been clearly shown that: 1) coronary MDCT is reliable to rule out the presence of significant coronary stenoses in patients with suspected coronary artery disease; and 2) the current state-of-the-art CT technique cannot replace invasive coronary angiography (1–3). We agree with Drs. Min and Berman that the ability of CT to exclude disease is important for patients. But we also know that coronary CT is not perfect. Several issues, including radiation exposure, calcifications, and arrhythmias, are still problematic for coronary CT scanning. Initially coronary MDCT was associated with a rather high radiation exposure; new protocols (prospective electrocardiogram [ECG]-triggered acquisition) or radiation exposure-reducing technology (ECG gated tube modulation) have now achieved acceptable radiation exposure—as low as 2 to 3 mSv (4).

Coronary calcification causing misinterpretation of the presence and severity of coronary stenoses remains a significant problem that can only be alleviated by better CT detector technology that significantly improves the spatial resolution. Very recently the Gemstone scintillator technology has been introduced that, in an ideal phantom setting, significantly improved the spatial resolution up to 230 μm. Also the problems of significant cardiac arrhythmias (atrial fibrillation), which are still problematic for cardiac CT, will be resolved by new CT technology that needs only 1 heartbeat to acquire data for coronary imaging. Another problem, raised by Dr. Nicol and colleagues, is overestimation of visual assessment of the severity of CT coronary stenoses, which has in the past also been a problem with invasive coronary angiography. Accurate automated contour-detection algorithms developed for coronary MDCT might resolve this issue. Another important issue raised by Dr. Nicol and colleagues is the mismatch between CT anatomy imaging and functional imaging. The assumption that a significant stenosis defined as >50% luminal diameter is hemodynamically significant is not always confirmed by myocardial perfusion.

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