

**Non-invasive coronary computed tomographic angiography
for patients with suspected coronary artery disease:
the Coronary Angiography by Computed Tomography
with the Use of a Submillimeter resolution (CACTUS) trial**

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Review

Non-invasive coronary angiography by multislice computed tomography (MSCT) for diagnosis of coronary artery disease (CAD) has reported by a lot of authors: Nieman (2002), Ropper (2003), Oncel (2004) for 16 Slice CT; Leschka, Raff, Mollet (2005) for 64 Slice CT angiography. However, the number of patient cohorts has been from 52 to 80; the results have shown different values in the sensitivity, the specificity, the positive predictive value, the negative predictive value, and the accuracy. In this report, the authors have enrolled 243 patients with an intermediate pre-test probability for having CAD. All patient cohorts have undergone non-invasive coronary CT angiography and been confirmed by invasive catheterization, the gold standard for the diagnosis of CAD.

In the trial, so-called the Coronary Angiography by Computed Tomography with the Use of a Sub millimeter resolution (CACTUS), 16 x 0.75 mm collimation was used for 16-slice CT and 32 x 0.6 mm collimation with z-flying focal spot was used for 64-slice CT.

The authors have many interesting notices:

- Compared with invasive angiography, MSCT was accurate in the detection of significant lumen narrowing. From the 102 patients with CAD detected with invasive angiography, 101 were correctly recognized with coronary MSCT angiography.
- One stenosis (55% by quantitative analysis of the invasive angiogram) at the origin of the posterior descending branch of the right coronary artery was underestimated by non-invasive MSCT.
- The sensitivity was 99%, the specificity was 75%, and the negative predictive value was 99%. These parameters have not significant different from the results of other authors (Table 1).

Table 1. CT EVALUATION OF CORONARY ARTERY STENOSIS (Jill E. Jacobs 2006)

	CT rows	# PTs	% Segs Assessed	Sens (%)	Spec (%)	PPV (%)	NPV (%)	Acc (%)
Nieman Circ '02	16	59	93	95	86	80	97	97
Ropers Circ '03	16	77	88	92	93	79	97	93
Oncel RSNA '03	16	80	96	94	92			
Kuettner JACC '04	16	60	79	72	97	72	97	
Leschka Eur Ht J '05	64	67	100	94	97	87	99	
Mollet Circ '05	64	52	100	99	95	76	99	
Raff JACC '05	64	70	89	91	92	80	97	

- On the basis of these values, CT angiography would have indicated not to perform invasive angiography in 44% of patients. On the other hand, CT angiography indicated the need for an 'unnecessary' invasive testing in 14% of patients without CAD as a result of an overestimation of lumen narrowing or inconclusive results. In the 16 patients with inconclusive result by MSCT, severe coronary calcifications and motion artifacts in at least one coronary segment were the main reasons for that.

With the flow of study participants (figure 1) in page 3037, they has demonstrated a lot of results regarding advantage of MSCT angiography, comparison between MSCT and invasive angiography on per-artery and per-segment basis, diagnostic accuracy with low vs. high Framingham risk scores, diagnostic accuracy with 16-vs. 64 slice CT, influence of coronary calcifications on MSCT accuracy, comparison of radiation dose estimates and contrast dye volumes. All of these remarks are very useful for clinical practice. So far, the studies have shown that coronary MSCT is insensitive for the discrimination of lesions exceeding 50% and e.g. 70% in diameter reduction. In this study, small coronary segments (diameter < 2.0 mm) were excluded from the analysis, which might lead to a selection bias and to a possible

overestimation of the sensitivity because stenoses in those small segments would have been missed owing to the limited spatial resolution of MSCT. Nevertheless, the analysis of the study limited to coronary segments ≥ 2.0 mm would be clinically justified since stenoses in coronary segments with a diameter of < 2.0 mm do usually not represent a target for revascularization procedures. I believe that the results of the study would be reliable because of the sophisticated methodology.

References

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