

Automatic Detection of Myocardial Perfusion Defects in Patients Undergoing 256-Row Coronary CTA

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Background: 256-row coronary CT angiography (CCTA) has the potential to assess both coronary anatomy and myocardial perfusion. We studied the ability of a fully automatic tool to detect CCTA myocardial perfusion defects (MPD) compared to a reference standard of Tc99m SPECT perfusion imaging.

Methods: 68 pts with suspected or known CAD (age: 63±11 yrs, 24% female) were evaluated by both CCTA and SPECT. MPD on CCTA was automatically computed and presented as a defect probability map (CTDP)(Philips). CTDP is based on probabilistic tissue modeling, where each pixel is classified according to its maximum a-posteriori probability to belong to a normal or abnormal myocardium. SPECT uptake was graded from 0 (normal) to 4 (no uptake) on the resting images. Performance of CTDP to detect moderate-severe SPECT-MPD (grade ≥2) at rest was analyzed on a pt and vessel territory based analysis.

Results: Amongst 35 SPECT positive vessel territories CTDP correctly identified 31 (89%), and amongst 169 SPECT negative territories CTDP correctly identified 144 (85%). Amongst 28 positive SPECT pts CTDP correctly identified 25 (89%), and amongst 40 SPECT negative pts CTDP correctly identified 24 (60%) (Table).

Conclusions: In this preliminary study of automatic analysis of MPD: 1. CTDP showed high sensitivity and NPV but moderate specificity and PPV to detect SPECT-MPD at rest. 2. CTDP may forewarn the examiner of a possible MPD and due to its high NPV may indicate a low probability of significant rest MPD's in pts undergoing 256-row CCTA.

Parameter	Vessel territory based analysis (95% CI) (N=204)	Patient based analysis (95% CI) (N=68)
Sensitivity	89% (78-99)	89% (78-100)
Specificity	85% (80-91)	60% (45-75)
Negative predictive value	97% (96-100)	89% (77-100)
Positive predictive value	55% (42-68)	61% (46-76)
Predictive accuracy	86% (81-91)	72% (61-83)