



Computer-Aided Detection of Coronary Artery Stenosis at Computed Tomography Angiography: Effect on Performance of Readers with Different Experience Levels

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Introduction: Successful interpretation of coronary CT angiography (cCTA) studies requires considerable experience as there are various challenges and pitfalls, potentially resulting in missed detection of significant stenosis or overestimation of non-significant lesions. We evaluated the effect of computer-aided detection on the performance of readers with different experience levels for diagnosing stenosis at cCTA.

Methods: Five observers with experience levels ranging from inexperienced to expert evaluated cCTA examinations of 50 patients (32 male, 18 female; age range 58±11 years) for coronary artery stenosis ≥50%. After three months the same five observers reevaluated all studies, this time guided by a computer-aided detection system as a second reader. Quantitative catheter angiography served as the reference standard.

Results: QCA revealed 29 stenoses ≥50%. For stenosis detection, the sensitivity of the computer-aided detection system alone averaged 67% per-vessel and 100% per-patient. Inexperienced readers' initial interpretations averaged 65% sensitivity per-vessel (86% per-patient) which improved to 82% (100%) with computer-aided detection. Intermediate reader sensitivity increased from 92% (93%) to 96% (93%), whereas sensitivity of expert readers increased from 87% (96%) to 89% (96%). With computer-aided detection, the number of false negative patients was reduced from an average 2 to zero for the inexperienced readers but remained unchanged for more experienced readers.

Conclusions: Our results suggest that computer-aided detection improves reader performance for diagnosing coronary artery stenosis at cCTA especially for inexperienced readers and particularly on a perpatient level.