



Fully Automated (No Human Interaction) Coronary CTA Analysis and Workflow Solution

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Introduction: Coronary Artery Disease (CAD) is the number one killer in the US. Until recently conventional coronary angiography was required to establish a definitive diagnosis of CAD. CCTA is now emerging as an important tool in the investigation of patients with suspected CAD. However, there are several factors that could adversely affect the adoption of CCTA in clinical practice, including complexity and time-consuming nature of this technique and at times, unavailability of experienced reader. We describe a new FDA approved technology, COR Analyzer II which addresses this limitation through computer-assisted automation.

Methods: In order to assess the diagnostic performance of COR Analyzer II we conducted a study comparing the results produced by the system to findings reported by two experienced level III CCTA readers. The experiment was performed on 154 CCTA studies, (151 studies from 64 slice MDCT and 3 studies from 16 slice MDCT). The readers independently reviewed the results and agreed on 147 out of 154 cases (95%). The readers reached a unified agreement on 7 cases (5%) after reviewing these cases jointly.

Results: COR Analyzer II defines study as positive when it finds at least one significant lesion (more than 50% stenosis). Four different results are possible, including: Negative - no significant pathologies are detected; Positive – severe pathologies are detected; Warning - no severe pathologies found, but there are potential problems in automatic analysis; Failed – automatic analysis is failed. In our experiment, the system failed to process automatically 16 studies (10%). There were 63 positive (P) and 75 negative (N) cases. The measured system performance was: Hits (TP) 58, Misses (FN) 3, True negative (TN) 51, (FP) 20, Warnings on Positive (WP) 2, Warnings on Negative (WN) 4. If warnings are considered positive the derived statistics are: Sensitivity 95.2%; Specificity 68%; NPV 94.4%; PPV 71.4%. If warnings are not considered positive, Specificity is 73.3%; PPV is 74.4%.

Conclusion: Based on our initial experience and the results of the conducted experiments, we believe that software-based fully automatic analysis of CCTA studies is feasible. There is potential for improved triage in the ER setting with reduction of time to treatment, improved mortality and morbidity, reduction of unnecessary hospital admissions, reduction of unnecessary emergency calls to expert readers and overall significant healthcare cost savings.

Sensitivity (TP+WP)/P	Specificity TN/N	NPV TN/(TN+FN)	PPV (TP+WP)/(TP+WP+FP+WN)
95.2%	68.0%	94.4%	71.4%