Cardiovascular risk assessment based on the quantification of coronary calcium in contrast-enhanced coronary computed tomography angiography.

The extent of coronary artery calcification (CAC) has been shown to be a strong and independent predictor for cardiovascular events. Usually, CAC scoring is performed in non-contrast-enhanced computed tomography (CT) examinations. The ability and accuracy of cardiovascular risk classification according to the degree of CAC determined in contrast-enhanced coronary CT angiography (CCTA) has not been investigated so far. The aim of this analysis was to develop and validate a method for CAC risk classification in CCTA.

In a test series of 100 patients who underwent both non-enhanced CAC scoring and CCTA, we developed a method to assess the extent of coronary calcification and the associated cardiovascular risk category in CCTA. The accuracy of the developed approach of CAC assessment in CCTA was determined in 500 consecutive patients in comparison to CAC scoring in the non-enhanced scan. CAC scoring results in the non-enhanced scan and CCTA scan showed a high correlation ($r = 0.954; P < 0.001$). CAC quantification in CCTA correctly identified 98% of patients without CAC as shown in the non-enhanced scan (184 of 188 patients). When compared with non-enhanced CAC scoring, CAC scoring in CCTA grouped more than 95% of high-risk patients correctly into the same risk category according to
the 75th age- and gender-specific percentiles or the absolute calcium scores. Assessing cardiovascular risk associated with CAC is feasible and accurate in contrast-enhanced CCTA. This new technique may allow for reducing the radiation exposure of coronary CT studies while maintaining an accurate cardiovascular risk assessment, because the addition of non-enhanced scans to CCTA becomes unnecessary for comprehensive coronary CT studies.

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