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Integration of estimated glomerular filtration rate biomarker in image-based cardiovascular disease/stroke risk calculator: a south Asian-Indian diabetes cohort with moderate chronic kidney disease

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Abstract

Background: Recently, a 10-year image-based integrated calculator (called AtheroEdge Composite Risk Score-AECS1.0) was developed which combines conventional cardiovascular risk factors (CCVRF) with image phenotypes derived from carotid ultrasound (CUS). Such calculators did not include chronic kidney disease (CKD)-based biomarker called estimated glomerular filtration rate (eGFR). The novelty of this study is to design and develop an advanced integrated version called-AECS2.0 that combines eGFR with image phenotypes to compute the composite risk score. Furthermore, AECS2.0 was benchmarked against QRISK3 which considers eGFR for risk assessment.

Methods: The method consists of three major steps: 1) five, current CUS image phenotypes (CUSIP) measurements using AtheroEdge system (AtheroPoint, CA, USA) consisting of: average carotid intima-media thickness (cIMTave), maximum cIMT (cIMTmax), minimum cIMT (cIMTmin), variability in cIMT (cIMTV), and total plaque area (TPA); 2) five, 10-year CUSIP measurements by combining these current five CUSIP with 11 CCVRF (age, ethnicity, gender, body mass index, systolic blood pressure, smoking, carotid artery type, hemoglobin, low-density lipoprotein cholesterol, total cholesterol, and eGFR); 3) AECS2.0 risk score computation and its comparison to QRISK3 using area-under-the-curve (AUC).

Results: South Asian-Indian 339 patients were retrospectively analyzed by acquiring their left/right common carotid arteries (678 CUS, mean age: 54.25±9.84 years; 75.22% males; 93.51% diabetic with HbA1c ≥6.5%; and mean eGFR 73.84±20.91 mL/min/1.73m²). The proposed AECS2.0 reported higher AUC (AUC=0.89, P<0.001) compared to QRISK3 (AUC=0.51, P<0.001) by ~74% in CKD patients.

Conclusions: An integrated calculator AECRS2.0 can be used to assess the 10-year CVD/stroke risk in patients suffering from CKD. AECRS2.0 was much superior to QRISK3.

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