Abbreviations

ACC/AHA	American College of Cardiology/American Heart Association
CAC	Coronary artery calcium
CAD	Coronary artery disease
CT	Computed tomography
ECG	Electrocardiograph
FRS	Framingham risk score
LDCT	Low dose CT
MESA	Multi-Ethnic Study of Atherosclerosis
MDCT	Multidetector CT
NCCT	Noncontrast CT
NLST	National Lung Screening Trial
SCCT	Society of Cardiovascular Computed Tomography
SDM	Shared decision making
STR	Society of Thoracic Radiology.

Several analytic approaches have been employed for measurement and reporting. CAC scoring of non-gated examinations has been shown to correlate well with scores obtained from traditional ECG-gated scans. Ordinal scoring based on a semi-quantitative analysis has correlated well with CAD outcomes. A CAC score can potentially be reported from the approximately 7.1 million annual diagnostic noncontrast CT (NCCT) examinations performed annually in the United States.[6] There will potentially be another 7–10 million low dose screening chest CT examinations per year if lung cancer screening reaches the individuals at risk for lung cancer, as defined by the 2014 U.S. Preventive Services Task Force statement[7] which mandates coverage by third party payors under the terms of the Affordable Care Act, and the subsequent 2015 Center for Medicare & Medicaid Services coverage decision for this service.[8] Using standard risk factor based paradigms, the majority of the high risk, older, current and former heavy smokers for whom lung cancer CT screening is recommended have an intermediate to high risk for coronary artery disease (Fig. 1).[9]

The purpose of this joint guideline from the Society of Cardiovascular Computed Tomography and the Society of Thoracic Radiology is to endorse the reporting of CAC on all NCCT examinations as the appropriate standard of care, to increase awareness of the prognostic importance of CAC among physicians ordering CT irrespective of the physician's specialty, and to develop risk classifications that may be included in the CT report. Formal recommendations for management, similar to the lung cancer CT screening abnormalities using Lung-RADS ™[10] will be part of forthcoming SCCT Expert Consensus and CAC-RADS documents.

The Society of Cardiovascular Computed Tomography (SCCT) and the Society of Thoracic Radiology (STR) have jointly produced this document. Experts in this subject have been selected from both organizations to examine subject-specific data and write this guideline in partnership. A formal literature review, weighing the strength of evidence has been performed. When available, information from studies on cost was considered. Computed tomography (CT) acquisition, CAC scoring methodologies and clinical outcomes are the primary basis for the recommendations in this guideline.

This guideline is intended to assist healthcare providers in clinical decision making. The recommendations reflect a consensus after a thorough review of the best available current scientific evidence and practice patterns of experts in the field and are intended to improve patient care while acknowledging that situations arise where additional information may be needed to better inform patient care.

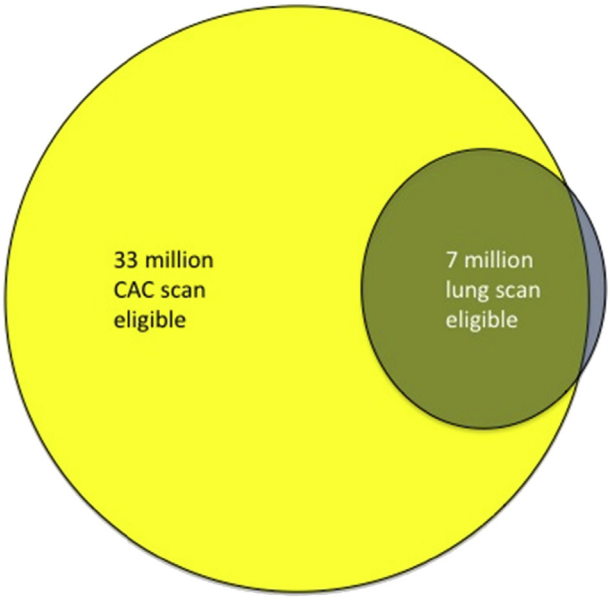

Fig. 1. United States estimates, and overlap, of CAC and lung scan eligible patients. The number of eligible patients in the United States is estimated at 33 million for CAC scanning (orange)[36] and 7 million for lung scanning (yellow).[27] Excluding lung scan eligible patients who have established coronary disease (5.3%, unpublished data from the I-ELCAP database) yields an overlap of 6.6 million lung scan patients who would be expected to benefit from CAC scanning. Reprinted with permission of Oxford University Press from Hecht HS, Henschke CI, Yankelevitz D, Fuster V, Narula J. Combined Detection of Coronary Artery Disease and Lung Cancer. Eur Heart J 2014: 35:2792–6.

The SCCT and STR have made every effort to avoid actual, potential, or perceived conflicts of interest that may arise as a result of industry relationships or personal interests among the authors. Authors were asked to disclose all current and prior relationships that may be perceived as relevant prior to initiation of the review and its resulting manuscript. Relationships with industry (RWI) and potential conflicts of interest (COI) pertinent to this guideline for authors are disclosed in Appendix 1 (available online at www.journalofcardiovascularct.com).

1.1. Evidence supporting CAC for risk assessment

Multiple algorithms have been proposed to help clinicians identify who is, and who is not, at high risk for CAD. Framingham risk scores (FRS), Pooled Cohort Equations, Reynolds risk score, highly sensitive C-reactive protein (hs-CRP), carotid intima media thickness (CIMT) and CAC are among the various measures that can be used for risk stratification of cardiovascular disease among asymptomatic population.[3,11] Of all the proposed tests, the CAC score has emerged as the strongest risk prediction tool.[2] It represents calcific atherosclerosis in the coronary arteries and correlates well with the overall burden of coronary atherosclerosis.

The FRS was the most commonly used cardiovascular risk stratification tool in the general population due to its ease of use, but has been replaced by the 2013 ACC/AHA Cholesterol Guidelines Pooled Cohort Equations.[4] However, both are probabilistic equations derived from populations, and, therefore, have limited accuracy for risk assessment in the individual. Because CAC can be considered a measure of the disease, it presents the opportunity to intervene with lifestyle changes, statins, and aspirin.

The prognostic value of CAC testing been well validated in multiple studies, including Dallas Heart[12] Rotterdam,[13] St Francis,[14] Multi-Ethnic Study of Atherosclerosis (MESA)[15] and the Heinz-Nixdorf Recall[16] among others. CAC has been shown to be the