

Role of imaging in primary prevention: calcium score is a robust and cost-efficient risk modifier

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Atherosclerotic cardiovascular disease (ASCVD) prevails as a major cause of morbidity and mortality all over the world, despite substantial improvement in outcomes by implementing better diagnostics and therapies [1]. The Framingham study [2], a milestone in preventive cardiology, identified the traditional major cardiovascular risk factors, and environmental as well as behavioural risk factors. The latest released guidelines on primary prevention of ASCVD consolidate existing recommendations, expert consensus papers, scientific statements and clinical practice guidelines, and conclude that cardiovascular events are avoidable by promoting a healthy lifestyle to prevent and control cardiovascular risk factors [3]. Therefore, the 10-year ASCVD risk estimation remains the keystone of therapeutic decisions in primary prevention, as long as there is no other very high-risk situation such as diabetes or familial hypercholesterolaemia, where medical treatment is essential in any case. Beside lifestyle modification, a crucial role is given to statin therapy. Statins are the first-line treatment for high-risk patients (strong recommendation, class I) [3, 4]. However, there is an uncertainty in individuals without a high cardiovascular risk profile. In these asymptomatic individuals, imaging of subclinical atherosclerosis can improve risk stratification beyond traditional risk scores and facilitate treatment decision.

Now in *Swiss Medical Weekly*, Romanens et al. provide a comprehensive review on the role of different imaging modalities, with a focus on sonographic assessment of carotid atherosclerosis for the risk stratification in primary prevention [5]. They conclude that sonographic assessment of carotid atherosclerosis could be the primary applied method in these situations. Refining risk assessment using imaging can lead to two major advantages. On the one hand, absence of atherosclerosis can avoid unnecessary therapy, whereas on the other hand, the existence of prognostically relevant atherosclerotic burden can give reason for long-term statin therapy and accept (although rare but known) possible side effects such as myopathy or an increased risk of developing diabetes. The sonographic assessment of carotid intima-media thickness does not result in reliable outcome prediction and is therefore not recommended (class III) for the risk stratification or not even mentioned in the latest European and American guidelines [6–8]. In contrast, presence or quantification of carotid

plaques, assessed by sonography, seems to be an accurate prognostic tool [9]. Similarly, using a different modality, non-contrast computed tomography, Nasir et al. [10] and Mahabadi et al. [11] have shown the strong prognostic value of plaques in the coronary arteries by determination of the coronary artery calcium score (CACS, also called the Agatston score) [12]. Romanens et al. mention the excellent discriminatory prognostic power of CACS, but they conclude that CACS may act as a second method and only in selected cases, where ultrasound does not yield conclusive results. Although, carotid ultrasound has the advantage of not using x-rays, the radiation dose in CACS is nowadays low and in the sub-millisievert range [13]. Furthermore, carotid ultrasound is dependent on local expertise, whereas CACS is a well-established, simple and robust method with excellent reproducibility [14]. In direct comparison, CACS improved prediction, discrimination and reclassification of ASCVD better than carotid ultrasound measurements, although prediction and discrimination were similar for strokes [15].

Based on the evidence and large-scale studies, CACS is given a recommendation of class IIa (“should be considered”) in the American guidelines, whereas sonographic assessment is not mentioned for the risk stratification in asymptomatic individuals [3]. Conversely, in the European guidelines for the management of dyslipidaemias, a IIa recommendation is given for arterial (carotid and/or femoral) plaque burden on arterial ultrasonography and a IIb for CACS, whereas in the text and references the CACS method is clearly more promoted [4]. In the recently published ESC guidelines for the diagnosis and management of chronic coronary syndrome, CACS and atherosclerotic plaque detection by carotid artery ultrasound are both given a IIb recommendation (“may be considered”) at a B level of evidence to consider them as a risk modifier [16]. In our opinion, the latest 2019 ACC/AHA guidelines on the primary prevention of cardiovascular disease give the most plausible and appropriate recommendations for the role of imaging techniques in primary prevention for asymptomatic patients. First, they classify non-high risk patients into intermediate, borderline and low risk, which leads to a better risk assessment and discrimination. Second, these guidelines emphasise that CACS is cost-effective and

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should be considered the primary imaging method in a case of borderline or intermediate risk profile [17].

Finally, the authors also give an important insight into a new concept of “negative risk markers” or “de-risking”, especially in the elderly who should remain a target of preventive medicine. A CACS of zero or below ten is the strongest negative risk marker, followed by absence of carotid plaque [18]. Consequently, de-risking leads to a de-escalation of therapy and prevents individuals from unnecessary treatments.

Overall, the review by Romanens et al. is of particular significance, since it highlights the association of subclinical atherosclerosis with outcome assessed by imaging, and the potential of imaging to enable providers to better tailor preventive therapy towards patient risk stratification compared to traditional risk scores.

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