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Editorial

Assessing vascular aging in young subjects with obesity: Usefulness and critical issues

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The assessment of carotid atherosclerosis markers is a valuable and established "best practice" in adults with several different conditions related to atherosclerotic cardiovascular disease (ASCVD). In particular, carotid intima-media thickness (CIMT), the thickness of the intimal and medial layer of the carotid artery wall, can be measured noninvasively by ultrasound imaging and is considered a marker for the early stage of arterial injury [1]. Moreover, CIMT progression has been shown to predict cardiovascular events in the general population, thus also having a prognostic value [2]. The presence of subclinical carotid plaques, in addition, is associated with higher risk of acute myocardial infarction depending on plaque size and stenosis [3]. Carotid stiffness (CS), evaluated by different parameters (distensibility coefficient, stiffness index β, Young's elastic modulus, Peterson's elastic modulus), is another important marker of arterial damage. Carotid imaging through non-invasive sonography may ultimately allow to collect relevant information for individual cardiovascular risk stratification in the general population [4], as well as in high ASCVD risk patients [5], thereby contributing to precision medicine approaches in the cardiovascular field [6].

Since arterial damage and atherosclerosis may begin at an early age in some conditions at greater ASCVD risk, like familial hypercholesterolemia (FH), the implementation of such carotid imaging techniques has appeared useful also in children affected by this genetic condition [7,8]. Children with heterozygous FH were actually shown to have a significantly greater CIMT than normal subjects, with a significant deviation starting at age 12, and with greater impact on boys than girls [9]. Another pathological condition associated with greater ASCVD risk is obesity, which has currently epidemic proportions worldwide [10]. In adults, obesity has been related to higher CIMT, also as a function of plasma leptin:adiponectin ratio [11] and of epicardial adipose tissue [12,13]. Today, childhood obesity represents a relevant public health problem in several countries and regions, including Europe [14], and is associated with an earlier occurrence of different comorbidities, like type 2 diabetes mellitus and a greater ASCVD risk later in life [15]. Based on these considerations, the specific evaluation of carotid markers such as CIMT and CS in children with obesity may offer important information on their vascular status and this is examined in the paper published by Büschges et al. in this issue of *Atherosclerosis* [16]. A relevant knowledge gap in this field is the development of accurate CIMT and CS centiles in young subjects, to be then utilized in association with obesity markers, such as body mass index, waist circumference, waist-to-height-ratio, fat and fat-free mass measurement by bioimpedance, subscapular skinfold thickness and blood pressure. The paper reports the results of the 11-year follow-up of the KiGGS cohort, which included sonographic CIMT and CS measurements in 4709 participants (age 14–28 years). Interestingly, CS was found to increase with age in both sexes, with males showing stiffer arteries than females. All obesity parameters at baseline and follow-up, except subscapular skinfold thickness, were positively associated with several CS parameters with moderate relative risks. The Authors conclude that these new CS percentiles show a consistent association of obesity with CS in young subjects.

This study gives an important contribution to a rather neglected area of research, since the evidence for an association between obesity and increased CIMT and CS in the younger subjects has often been limited by methodological challenges related to the young age of the study populations, methods of percentile derivation and comprehensiveness of the investigated obesity markers. Another open issue is the appropriate age at which starting carotid imaging studies [17], which may be standardized around 10–12 years, although some drug interventional studies started earlier, around age 6. This study then highlights that carotid imaging in children and adolescents with obesity offers important information regarding early subclinical atherosclerosis and vascular damage, and emphasizes the crucial role of early cardiovascular prevention.

Declaration of competing interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence

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