CIMT is associated with obesity and hypertension in young people

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Editorial

Atherosclerosis is thought to begin silently in childhood and progress throughout life. Fatty atherosclerotic streaks have been seen in children as young as 1 year [1] and carotid intima media thickness (CIMT) measurements have been used to detect early vascular remodelling, which is likely into persist into adulthood and predispose to later cardiovascular morbidity [2]. Reference ranges for CIMT in children are available [3, 4] but to date these have been obtained in small samples and with potential for selection bias of recruitment.

The 'German Health Interview and Examination Survey for Children and Adolescents' (KiGGS) study is a nationwide health survey established in Germany, with 26, 787 children between the ages of 0-17 years recruited [5]. As part of their follow-up, they measured CIMT in 4, 709 young people (50% male) aged between 14-28 years and the reference data obtained from this study are described in this issue of *Hypertension* [6]. The group benefitted from the population-based unselected national recruitment to this cohort and used semi-automated high resolution B mode ultrasound of the far wall of the distal common carotid artery to measure CIMT. From these data, Neuhauser et al. provide centile charts which have been validated in a large cohort of young people and take into account sex, age and height, all of which are associated with changes in CIMT. There is no doubt that these charts will therefore be invaluable to researchers in the assessment of vascular status in young people.

Fat free mass and systolic blood pressure have been identified as the only modifiable risk factors associated with CIMT in children [7]. The authors of this study, therefore, sought to determine the effects of obesity and hypertension on CIMT and used statistical modelling to identify if any particular factors were predictive of increased CIMT. As such, this is the first study to confirm that in young people with obesity or hypertension, CIMT is increased. In particular, in obesity, ~~one-off high blood pressures~~ a high blood pressure reading at the time of

CIMT, and previous raised blood pressure were found to be prognostic of increased CIMT, findings which should emphasise to clinicians the need to be vigilant with blood pressure screening and management in childhood.

That said, there are some limitations to these data. Nearly a quarter of the young people in this study were of a migrant background, defined as at least one parent who had emigrated to Germany or had a non-German nationality. It is not clear which non-Caucasian ethnicities are included in the sample or whether the CIMT values obtained differed in these groups, and this must be considered when using the values internationally. In addition, data ~~is~~ are presented in children over the age of 14 years and it is assumed that most of these children will therefore be post-pubertal but no pubertal assessments have been included. Puberty is a time of significant hormonal fluctuations and given that the sex steroids are vasoactive, it is difficult to ignore the likelihood of variable vascular phenotypes in pre- and post-pubertal children, although this has not yet been studied definitively. In adults, CIMT varies with sex and ethnicity [8], so these omissions should be taken into account when using them to calculate a CIMT Z-score in a young person. Indeed, as demonstrated in Figure 1, there are many variables which may affect CIMT and progression to end organ disease, all of which should be considered when reviewing the data from this study.

Finally, these data are part of a thorough large scale population study and as such, all measurements have been obtained using standardised equipment and techniques with staff rigorously trained in CIMT assessment to produce consistent results. It is not clear therefore if these centiles would remain valid with variations of equipment and protocol in centres outwith this study. It is hoped that studies like these will inspire standardisation of the approach to non-invasive vascular phenotyping in children and young people.

In conclusion, Neuhauser et al., provide robust evidence of the association between hypertension, obesity and increased CIMT, as well as centile charts for the assessment of CIMT Z-scores in young people, which are adjusted for height, age and sex. As with any reference data however, on an individual level, consideration must be taken into whether they are applicable for any population being studied prior to use.

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Conflicts of interest

Nil

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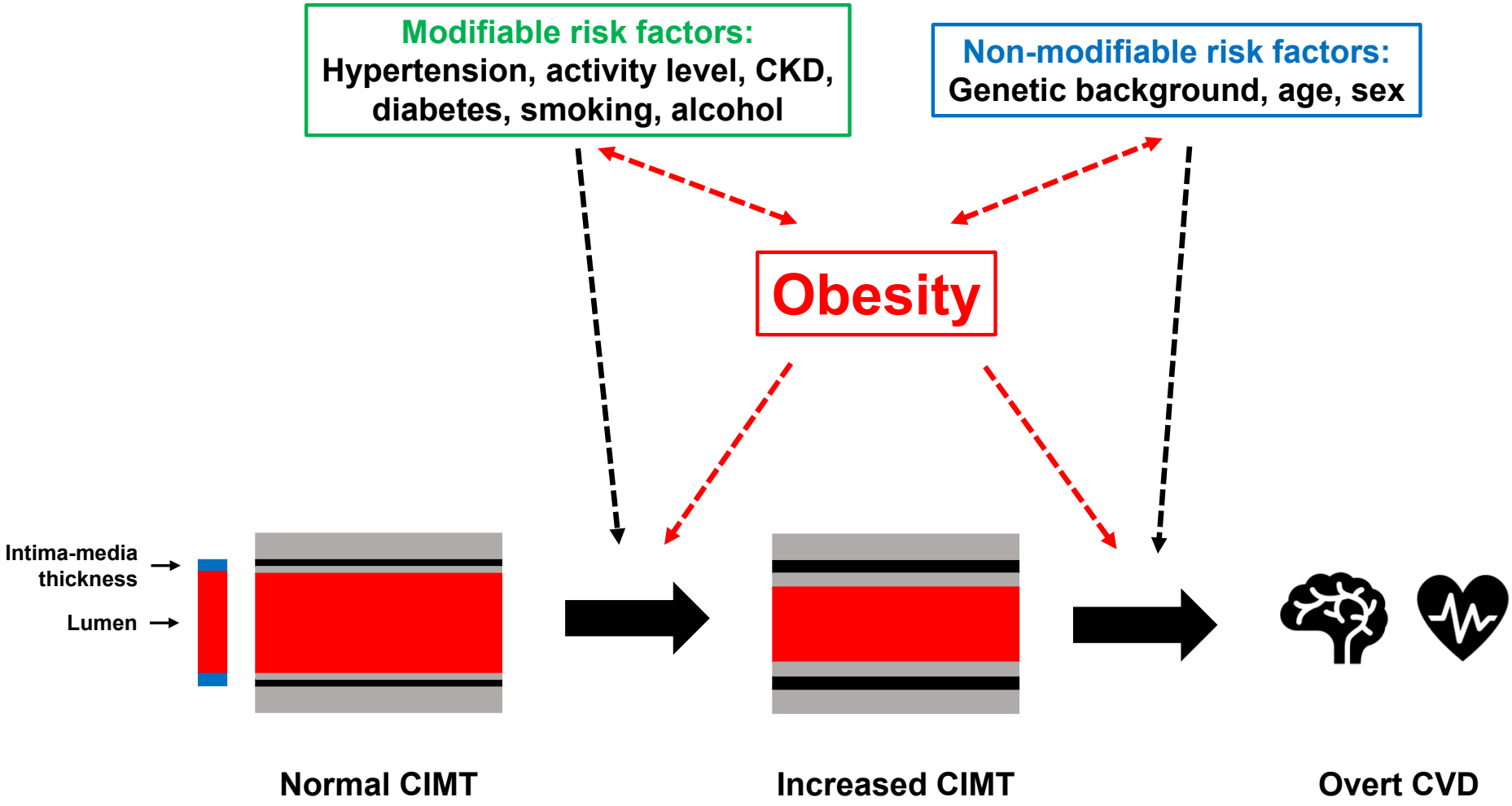
Legend to Figures

Figure 1. Interplay between CIMT development, obesity and other modifiable and non-modifiable factors. There is progression from normal to increased CIMT to overt cardiovascular disease, including stroke. Obesity is a risk factor for this and is associated with this progression but other modifiable and non-modifiable risk factors are involved. Obesity can also affect progression to cardiovascular disease by interaction with these shared risk factors. Abbreviations: CIMT: carotid intima media thickness; CKD: chronic kidney disease; CVD: cardiovascular disease.


Modifiable risk factors:
Hypertension, activity level, CKD, diabetes, smoking, alcohol
Non-modifiable risk factors:
Genetic background, age, sex
Obesity
Intima-media thickness
Lumen
Normal CIMT
Increased CIMT
Overt CVD