

### Average-Intima-Media-Thickness and Intima-Media-Roughness as new parameters for cardiovascular health in children

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#### Introduction:

Carotid artery intima media thickness (IMT) measurements and their interpretation in the paediatric age group represent a special challenge. On the other hand, this surrogate marker for atherosclerosis deserves special attention in counselling patients at risk for vascular complications as early as possible. Previously calculated reference values differed between studies. So, in the light of different reference data from different ultrasound systems and algorithms we are missing robust and easily applicable preventive parameters.

#### Methods:

We calculated "average" IMT from sonographic studies of the carotid artery in 709 school children from 8 – 18 y. The algorithm included both end diastolic and end systolic IMT during a minimum of 3 heart cycles eliminating errors of manual tracing or indefinite measurement points. Moreover, IMT-"roughness" as a function of difference from the mean and as a surrogate for IMT irregularity was calculated as well. From these parameters, we calculated age- and sex-specific percentiles using the LMS-method.

#### Results:

After eliminating studies from obese and hypertensive children, a total of 631 subjects were included (s. Table).

Age (years)		1 (8.0-10.9)	2 (11.0-13.9)	3 (14.0-17.9)
n	w	111	134	59
	m	124	177	26
IMT (mm)	w	0.48±0.04	0.49±0.03	0.50±0.04
	m	0.49±0.03	0.49±0.03	0.49±0.04
IMR (mm)	w	0.037±0.012	0.035±0.010	0.036±0.010
	m	0.035±0.011	0.033±0.010	0.038±0.011

We calculated age- and sex-specific percentiles for average-IMT and IMT-roughness. Also, tables of mean of avg-IMT and IMT-roughness were calculated reporting the L-, M- and S-value and allowing for calculation of z-scores from absolute parameters.

#### Conclusion:

Given the differences of actual IMT-normative values, we propose a more sophisticated calculation of IMT including diameters at end systole and end diastole. As these diameters are detected with an automated contour edge detection system and calculated from several measurements at different time points, they may represent more comparable surrogate markers for the "real" intima media thickness of the carotid artery. IMT-"roughness" may add valuable informations about the structure of the inner layer of the endothelium. Also, by using z-scores of both average-IMT and IMT-roughness, measurement results from different ultrasound systems and from different IMT measurement algorithms should be comparable throughout different studies.