Reference Values of Aortic Augmentation Index in a Large Healthy Population Aged 3-18 Years

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Basics: Aortic pressure augmentation caused by pressure wave reflection is a physiologically important phenomenon. The aortic augmentation index (Aix_{ao}) increases with age in adults and the increased Aix_{ao} is a strong predictor of cardiovascular morbidity and mortality. However, the pressure waveform in infants and children are similar to those in older adults, and thus the Aix_{ao} is higher in this group. Consequently the determination of reference values of Aix_{ao} in a large population of healthy children and adolescents is very reasonable.

Aims: To determine the reference values of Aix_{ao} in children and adolescents and to find the possible physiological mechanisms of the enhanced aortic pressure wave reflection during childhood.

Methods: Aix_{ao} were measured by a new non-invasive, occlusive, oscillometric method (Arteriograph, TensioMed Ltd., Hungary) in a healthy population aged 3-18 years with normal BMI and with normal blood pressure (1802 males, 1572 females). Smoothed percentile curves from 3rd to 97th were determined using LMS method. Results were analyzed by Student’s t-test.

Results: The physiological changes of Aix_{ao} measured in healthy population are shown in Figure 1. and 2. The Aix_{ao} decreased with age in both genders. From the age of 14 years the Aix_{ao} were significantly lower in males than in females (p<0.02), and this difference had become even more pronounced from age of 15 years (p<0.001). Assessing the background of these gender differences in Aix_{ao} we have found that the changes of the median of Aix_{ao} are exactly identical to the changes of the median of body height.

Conclusions: This is the first large population study involving 3374 healthy subjects aged 3-18 years which describes the physiological changes of Aix_{ao}. Our data provide supporting evidences that the pressure waveforms in infants and children are markedly elevated and similar to those with advanced age. This very interesting phenomenon can entirely be explained by the differences in body height (aortic length) with ageing. In children with the shorter body height (aortic length) the reflected wave returns earlier and increases the augmentation index (Aix_{ao}), not because of the stiffer arterial system.