

Real-Time 3D-Echocardiography of the Left Ventricle - Pediatric reference-values for left ventricular volumes using knowledge based reconstruction

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Background: Determining left ventricular (LV) volume and function is essential for therapy and follow-up in patients with heart disease. Real-time 3D echocardiography (RT3DE) is a promising method for LV assessment, however pediatric reference values are lacking. The aim of the study was to establish pediatric percentiles.

Methods: In a multicenter prospective design, 634 healthy children and adolescents (range, 1 day-216 months) underwent RT3DE imaging of the LV. After initial training, echocardiography was performed 5 by different operators with 5 different ultrasound machines of 2 vendors (ie 33, Philips; Vivid 7, GE) in 3 different centers. 583/634 (91.9%) RT3DE data sets were quantified using a vendor-independent software (TomTec LV2.7, Unterschleissheim, Germany). In a core lab, all analysis were done using a contour finding sensitivity of 30, depending on our previous correlation with CMR-data (1). Reference centile curves were computed using Cole's LMS method.

Results: Percentiles for LV enddiastolic, endsystolic and stroke volumes (EDV, ESV, SV) were gender dependent and are presented as volumes indexed to body surface (Haycock) in Fig. 1. Intra- and interobserver-variation for all parameter were excellent with intraclass correlation coefficients (ICC) between 0.935-0.998.

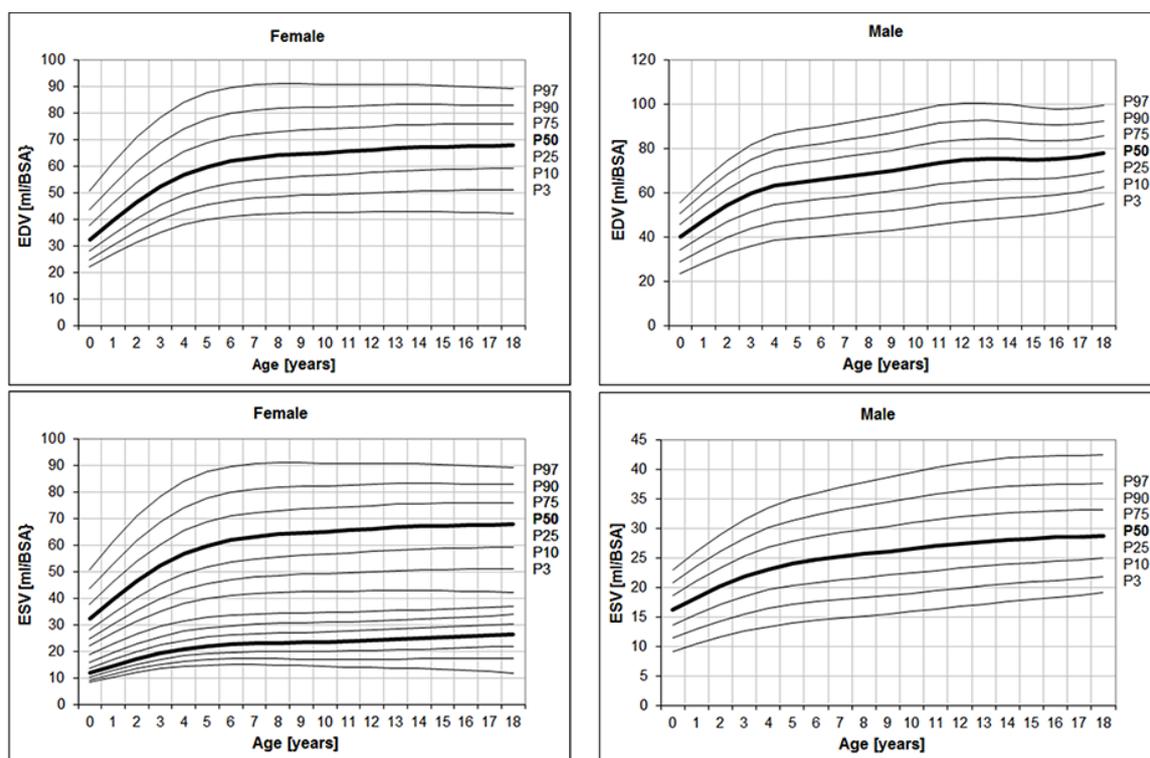


Fig. 1: Gender-dependent percentiles for LV volumes indexed to body surface (Haycock)

Conclusions: In children, calculation of LV volumes by vendor independent software is reproducible and accurate (1) if agreement on data acquisition and data analysis has been defined. The percentiles provided are based on a large sample size using different ultrasound machines and a vendor-independent software and may be useful for clinical practice and research.