

## **Prospective Analysis of Echocardiography Reference Ranges for Two-dimensional Right Atrial Strain by Contemporary Strain Software and Subgroups**

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**Background:** Right atrial reservoir (RASr), conduit (RAScd) and contractile (RASct) strains have increasing clinical utilities including for heart failure and pulmonary hypertension. Despite this, their normal ranges and feasibility of measurement with various software on different vendor scanners remain uncertain. We prospectively assessed means, lower limits of normal (LLN) and parameters affecting two-dimensional right atrial strain values across four contemporary strain software vendors in healthy subjects and subgroups.

**Methods:** We prospectively studied 100 healthy patients having clinically indicated transthoracic echocardiograms 2023/01-04, with equal number by 5 age-groups, 2 genders, and or Philips or GE scans. TomTec version 51.02 (Autostrain LA), EchoPAC version 206 (AFI-LA), VVI version 2.00 and Epsilon version 5.0.2.11295 software were used to measure right atrial strain for lower limit of normal (LLN) and regression analyses. **Results:** Overall means and LLNs±standard errors by strain vendor, and means±standard errors by age-groups, sex and scanner vendors for right atrial strains in healthy subjects are shown in the table. RASr (%) means and LLNs (95% confidence intervals) were 41.2 (38.5, 43.0) and 29.6 (26.5, 32.7) for TomTec, 35.9 (34.4, 37.3) and 27.0 (24.5, 29.5) for EchoPAC, 44.8 (42.3, 47.3) and 27.6 (23.3, 31.9) for VVI and 38.9 (36.7, 41.0) and 25.5 (21.7, 29.3) for Epsilon respectively. Linear mixed model regression analyses identified EchoPAC and VVI having significantly lower RASr magnitude and higher RAScd magnitude RASr than TomTec, and older age associated with lower magnitude of both RASr and RAScd. **Conclusion:** All strain software except EchoPAC demonstrated vendor-neutral properties to measure right atrial strain on GE and Philips scanners. Means and LLNs were reported for right atrial strains by software and subgroups for clinical applications, and

notably, these measurements were significantly affected by strain software and age.