

Comparative Analysis and Influential Factors of Right Ventricular Strain Measurements in Healthy Subjects Using Contemporary Speckle-tracking Echocardiography Software

Elio Haroun, Ankit Agrawal, Tiffany Dong, Aro Daniela Arockiam, Joseph El Dahdah, Muhammad Majid, Leonardo Rodriguez, Patrick Collier, Richard A. Grimm, Brian P. Griffin, Zoran B. Popovic, Tom Kai Ming Wang. The Cleveland Clinic Foundation, Cleveland, OH

Background: Speckle-tracking echocardiography, increasingly used to assess right ventricle function, particularly right ventricle longitudinal strain (both global: RVGLS, and free-wall: RVFWLS), has demonstrated prognostic value in cardiovascular disorders. Recent software advances allow analyzing scans from various scanner brands, overcoming past challenges. However, external validation remains necessary. We prospectively evaluated the reference ranges and correlations of RVGLS and RVFWLS by the latest strain software, focusing on healthy individuals and diverse subgroups.

Methods: We prospectively studied 100 healthy subjects who underwent echocardiography at our institution from January to April 2023. Echocardiography scans were equally split between GE and Philips, half of the participants were men and half women, they were evenly distributed across five age groups: 18-29, 30-39, 40-49, 50-59, and over 60 years;. TomTec version 51.02 (Autostrain RV), EchoPAC version 206 (AFI-RV), VVI software and Epsilon (EchoInsight ZF) version 5.0.2.11295 were used to quantify RVGLS and RVFWLS for comparative analyses. **Results:** The means and lower limits of normal (LLN, defined as the 95th percentile) for RVGLS and RVFWLS are detailed in Table 1. TomTec's RV strain measurements were more negative compared to other software across the entire cohort and subgroups. Additionally, measurements were slightly more negative with GE scanners than with Philips across all software. In the linear mixed models multivariable regression longitudinal analyses, factors with beta-coefficients and 95% CI significantly associated with RVGLS were female sex -1.36 (-0.49,-2.22); age per 10 years 0.3 (0.02,0.59), Philips versus GE scan 1.22 (0.42,2.02). Factors with beta-coefficients and 95% CI significantly associated with RVFWLS were heart rate (per 10 beats/minute) 0.48 (0.01,0.94) and Philips versus GE scan 1.15 (0.07,2.23). **Conclusion:** Important factors associated with RVFWLS and RVGLS measurements were identified, especially age, sex, heart rate, scanner type and strain software, which have important clinical implications. Additionally, RVGLS and RVFWLS measurements were feasible for all strain software on both GE and Philips scans, with means and LLN identified.

