

**Supplemental Table 2.** Studies assessing the value of right ventricular longitudinal strain in pulmonary hypertension

First Author, Journal, Year	Study population	Sample size (n)	Design	Metrics	Results	Cut-off value (%)
Fukuda Y, <i>J Am Soc Echocardiogr</i> , 2011(1)	Group 1	49	Prospective	RVFWLS	RVFWLS was significantly correlated with pulmonary pressure, pulmonary vascular resistance, RV ejection fraction and end-systolic volume	–
Sachdev A et al, <i>Chest</i> , 2011(2)	Group 1	80	Retrospective	RVFWLS <sup>a</sup>	Noninvasive assessment of RVFWLS and strain rate independently predicts future right-sided heart failure, clinical deterioration, and mortality	-12.5
Haeck ML et al, <i>Circ Cardiovasc Imaging</i> , 2012(3)	Group 1,2,3,4 PH	96	Retrospective	RVFWLS <sup>a</sup>	RVFWLS was significantly associated with all-cause mortality.	-19
Fine et al, <i>Circ Cardiovasc Imaging</i> , 2013(4)	Group 1, 3, 4 PH vs no PH	406 vs. 169	Prospective	RVFWLS	RVFWLS predicted survival when adjusted for pulmonary pressure, pulmonary vascular resistance, and right atrial pressure and provided incremental prognostic value over conventional clinical and echocardiographic variables.	-20 or 6.7% in RVFWLSde during follow-up
Motoji Y, <i>Circ J</i> , 2013(5)	Group 1	42	Prospective	RVFWLS	RVFWLS was the most powerful predictor of cardiovascular events at 4-year follow-up	-19.4
Hardegree et al, <i>Am J Cardiol</i> , 2013(6)	Group 1	50	Prospective	RVFWLS <sup>a</sup>	Persistence of or progression to a severe reduction in RVFWLS (<-12.5%) at	-12.5

					6 months after initiation of specific treatment was associated with greater disease severity, greater diuretic use, higher mean pulmonary artery pressure, and poorer survival. Patients with $\geq 5\%$ improvement in RVFWLS with therapy had a greater than sevenfold lower mortality risk at 4 years.	
Ikeda et al, <i>Life Sci</i> , 2014(7)	Group 1, 4 PH vs connective diseases without PH	17 vs 9	Prospective	RVFWLS taking into account only the basal and mid free-wall segments	RVFWLS was the only independent factor associated with mean pulmonary pressure $\geq 35$ mmHg and pulmonary vascular resistance $\geq 400$ dyne·sec·cm <sup>-5</sup>	-20.75
Park JH et al, <i>Korean Circ J</i> , 2015(8)	Group 1	34	Prospective	RV4CLS <sup>a</sup> , RVFWLS <sup>a</sup>	Both RV4CLS and RVFWLS correlate with functional and invasive hemodynamic parameters in PAH patients. Decrease of mean pulmonary pressure and pulmonary vascular resistance as a result of treatment was associated with improvement of RV strain parameters.	—
Freed et al, <i>Echocardiography</i> , 2015(9)	Group 1	30	prospective	RV4CLS	RV4CLS correlated well with RV ejection fraction measured by cardiac magnetic resonance	—
Van Kessel M et al, <i>Int J Cardiovasc Imaging</i> , 2016(10)	Group 1,3,4,5 and TAPSE $>16$ mm	57	Retrospective	RVFWLS	RVFWLS was a significant predictor of all-cause mortality in patients with PH and RV dysfunction, but with normal TAPSE	-20

da Costa AA et al, <i>Int J Cardiovasc Imaging</i> , 2017(11)	Group 1	66	—	RVFWLS	RVFWLS had good correlation with RV ejection fraction measured with CMR and was the only independent echocardiographic predictor of hospitalization and death	-14%
Kemal HS et al. <i>Echocardiography</i> , 2017(12)	Group1 and 4	92	Prospective	RVFWLS	RVFWLS correlated well with functional class, NT-proBNP, 6-minute walking distance and with all follow-up adverse events, death, and clinical right heart failure	-12.5

All the reported studies used GE Healthcare ultrasound systems and software packages except <sup>a</sup>Syngo Velocity Vector Imagng (Siemens Healthineer, Munich, D), <sup>b</sup>2D Cardiac Performance Analysis v4.5 (TomTec Imaging Systems, Unterschleissen, D)

*Abbreviations:* CMR, cardiac magnetic resonance; PAH, pulmonary artery hypertension; PH, pulmonary hypertension; RV, right ventricular; RV4CLS, right ventricular 4-chamber longitudinal strain; RVFWLS, right ventricular free-wall longitudinal strain;

## References

1. Fukuda Y, Tanaka H, Sugiyama D et al. Utility of right ventricular free wall speckle-tracking strain for evaluation of right ventricular performance in patients with pulmonary hypertension. *Journal of the American Society of Echocardiography : official publication of the American Society of Echocardiography* 2011;24:1101-8.
2. Sachdev A, Villarraga HR, Frantz RP et al. Right ventricular strain for prediction of survival in patients with pulmonary arterial hypertension. *Chest* 2011;139:1299-1309.
3. Haeck ML, Scherptong RW, Marsan NA et al. Prognostic value of right ventricular longitudinal peak systolic strain in patients with pulmonary hypertension. *Circ Cardiovasc Imaging* 2012;5:628-36.
4. Fine NM, Chen L, Bastiansen PM et al. Outcome prediction by quantitative right ventricular function assessment in 575 subjects evaluated for pulmonary hypertension. *Circ Cardiovasc Imaging* 2013;6:711-21.
5. Motoji Y, Tanaka H, Fukuda Y et al. Efficacy of right ventricular free-wall longitudinal speckle-tracking strain for predicting long-term outcome in patients with pulmonary hypertension. *Circulation journal : official journal of the Japanese Circulation Society* 2013;77:756-63.
6. Hardegree EL, Sachdev A, Villarraga HR et al. Role of serial quantitative assessment of right ventricular function by strain in pulmonary arterial hypertension. *Am J Cardiol* 2013;111:143-8.
7. Ikeda S, Tsuneto A, Kojima S et al. Longitudinal strain of right ventricular free wall by 2-dimensional speckle-tracking echocardiography is useful for detecting pulmonary hypertension. *Life Sci* 2014;111:12-7.
8. Park JH, Kusunose K, Kwon DH et al. Relationship between Right Ventricular Longitudinal Strain, Invasive Hemodynamics, and Functional Assessment in Pulmonary Arterial Hypertension. *Korean Circ J* 2015;45:398-407.
9. Freed BH, Tsang W, Bhawe NM et al. Right ventricular strain in pulmonary arterial hypertension: a 2D echocardiography and cardiac magnetic resonance study. *Echocardiography* 2015;32:257-63.
10. van Kessel M, Seaton D, Chan J et al. Prognostic value of right ventricular free wall strain in pulmonary hypertension patients with pseudo-normalized tricuspid annular plane systolic excursion values. *Int J Cardiovasc Imaging* 2016;32:905-12.
11. da Costa Junior AA, Ota-Arakaki JS, Ramos RP et al. Diagnostic and prognostic value of right ventricular strain in patients with pulmonary arterial hypertension and relatively preserved functional capacity studied with echocardiography and magnetic resonance. *Int J Cardiovasc Imaging* 2017;33:39-46.
12. Kemal HS, Kayikcioglu M, Kultursay H et al. Right ventricular free-wall longitudinal speckle tracking strain in patients with pulmonary arterial hypertension under specific treatment. *Echocardiography* 2017;34:530-536.