

# Validation of the isovolumetric relaxation time for the estimation of pulmonary systolic arterial blood pressure in chronic pulmonary hypertension

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## Abstract

### Aims

Transthoracic echocardiography is a useful technique for non-invasive detection of pulmonary arterial systolic pressure (PASP). Isovolumic relaxation time (IVRT) measured by Doppler tissue imaging (DTI) is a sensitive measurement of changes in pulmonary vasculature. Our aim was to validate IVRT in the echocardiographic assessment of pulmonary hypertension (PH) patients.

### Methods and results

We studied 196 PH patients (67% women, mean age  $51.8 \pm 16.6$  years, mean PASP:  $81 \pm 24$  mmHg) and 37 consecutive age- and sex-matched controls (58% women, mean age  $44.7 \pm 16.4$  years, mean PASP  $27.7 \pm 5.5$  mmHg). The estimation of PASP was derived from tricuspid regurgitation velocity according to the Bernoulli equation. The measurement of IVRT was calculated using pulsed tissue Doppler. In the PH group and in the healthy volunteers group ( $P < 0.0001$ ), the average IVRT was  $113.4 \pm 28.5$  ms [95% confidence interval (CI): 109–117] and  $41 \pm 12.5$  ms (95% CI: 37–45), respectively. We found a strong correlation between IVRT and systolic pulmonary pressure in the PH group ( $r = 0.52$ ,  $P < 0.0001$ ) and a cut-off of 75 ms showed a sensitivity and specificity of 94% and 97%, respectively, for the prediction of elevated PASP.

### Conclusion

The determination of IVRT by DTI is a simple and reproducible method that correlates well with PASP. It is, therefore, a parameter to consider in the echocardiographic assessment of patients with PH, and may be particularly important when the tricuspid Doppler signal is poor.

## Keywords

Pulmonary hypertension, Isovolumic relaxation time, Doppler tissue imaging, Right ventricle