

Poster presentation

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## Comparison between velocity-encoded magnetic resonance imaging and tissue Doppler imaging to assess timings of right ventricular mechanics in children with corrected Tetralogy of Fallot

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### Objective

To compare Velocity-Encoded Magnetic Resonance Imaging (VE-MRI) with Tissue Doppler Imaging (TDI) for the assessment of right ventricular (RV) mechanics in healthy subjects and in patients with corrected Tetralogy of Fallot (cToF).

### Background

In cToF patients, Cardiac resynchronisation therapy (CRT) has proven to be a successful treatment for RV failure. However, selection criteria for CRT in cToF patients remain unclear. Knowledge of timings of RV mechanics in healthy controls and cToF patients is important to identify which patients could benefit from CRT. VE-MRI can be applied for myocardial velocity analysis similar to TDI. Previous studies reported good correlations between VE-MRI and TDI for the assessment of LV mechanics. Thus far, the application of VE-MRI to assess RV mechanics has not been validated.

### Methods

33 cToF patients ( $13.1 \pm 2.8$  year) and 19 healthy subjects ( $14 \pm 2.4$  year) underwent both VE-MRI and TDI of the RV. Timings of peak systolic longitudinal velocities were assessed with both techniques at the basal septum, the basal RV free wall (RVFW) (Figure 1) and at the lateral side of the right ventricular outflow tract (RVOT).

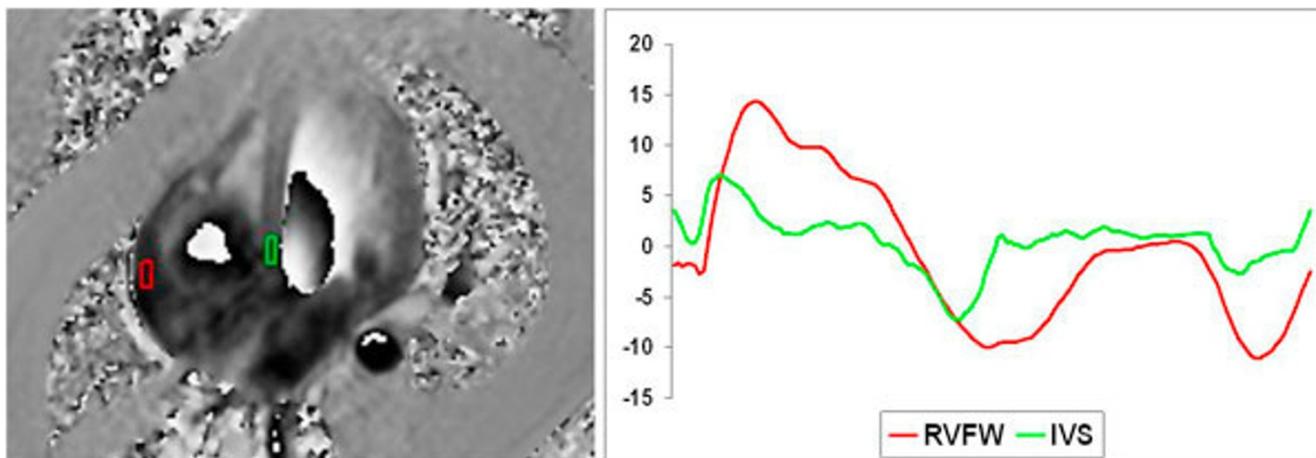
### Results

Good correlations were found between VE-MRI and TDI at the septum (patients  $r = 0.88$ ,  $p < 0.001$ , controls  $r = 0.96$ ,  $p < 0.001$ ), RVFW (patients  $r = 0.90$ ,  $p < 0.001$ , controls  $r = 0.93$ ,  $p < 0.001$ ) and RVOT (patients  $r = 0.92$ ,  $p < 0.001$ , controls  $r = 0.76$ ,  $p < 0.001$ ). No significant differences between the techniques were observed at the RVFW (Table 1). VE-MRI measured slightly later timings than TDI in patients at the septum (difference 0.7%,  $p = 0.002$ ) At the RVOT, VE-MRI measured slightly later timings in controls (difference 0.9%,  $p = 0.005$ ). Although statistically significant, the observed differences are very small and therefore probably not clinically relevant.

### Conclusion

VE-MRI is an accurate tool to assess timings of RV mechanics in healthy controls and in cToF patients. In the future, VE-MRI may aid in the selection of cToF patients for CRT.

Comparison of timings to peak systolic velocities of the right ventricle between TDI and VE-MRI. Timings are expressed as percentage of the cardiac cycle. Abbreviations: cToF: corrected Tetralogy of Fallot, IVS: interventricular septum, RVFW: right ventricular free wall, RVOT: right ventricular outflow tract.



**Figure 1**  
VE-MRI of the RVFW and IVS.

**Table 1: Comparison between TDI and VE-MRI**

	cToF patient			control		
	TDI	VE-MRI	p-value	TDI	VE-MRI	p-value
<b>IVS (%)</b>	8.3 ± 2.6	9.0 ± 2.7	0.002	10.0 ± 2.1	9.7 ± 1.9	0.058
<b>RVFW (%)</b>	12.7 ± 3.5	12.9 ± 3.7	0.386	17.7 ± 3.8	17.7 ± 3.9	0.935
<b>RVOT (%)</b>	6.2 ± 2.4	6.5 ± 2.5	0.079	7.5 ± 1.7	8.4 ± 1.8	0.005

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