

Heart Failure

LONGITUDINAL AND TRANSVERSE IMPEDANCE CAN QUANTIFY LEFT VENTRICULAR DIASTOLIC FUNCTION

ACC Moderated Poster Contributions
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Background: Longitudinal (Z_L) and transverse (Z_T) impedances are used in vascular biology to describe arterial system properties. These established physiologic metrics have not been previously considered for diastolic function assessment. We hypothesized that Z_L and Z_T are causally related to LV longitudinal filling function characterized by E/E'.

Methods: For proof of concept 4 subjects were selected from our database. Two had impaired longitudinal function (classified by Tissue Doppler E'peak < 8 cm/s and Doppler E/E' > 8) and 2 subjects had normal E/E'. Simultaneous LV pressure (Millar catheter) and Doppler E-wave data was analyzed. Z_L and Z_T as previously defined were computed.

Results: Z_L average was 1.4 mm Hg. s/cm⁴ for two subjects with impaired longitudinal motion and 0.9 mm Hg. s/cm⁴ for two controls. The value of Z_T was 91 mm Hg. s/cm² for subjects with impaired longitudinal motion and 260 mm Hg. s/cm² for controls.

Conclusions: Our proof of concept results show that subjects with impaired longitudinal motion (low E') have: 1) higher Z_L than controls, indicating higher long axis resistance (impedance mismatch) to filling 2) lower Z_T compared to controls, indicating lower transverse resistance to filling as a compensatory feature to maintain stroke volume. Hence, directional impedances characterize filling pattern of the LV based on directional chamber properties. Further study in larger sample is in progress.

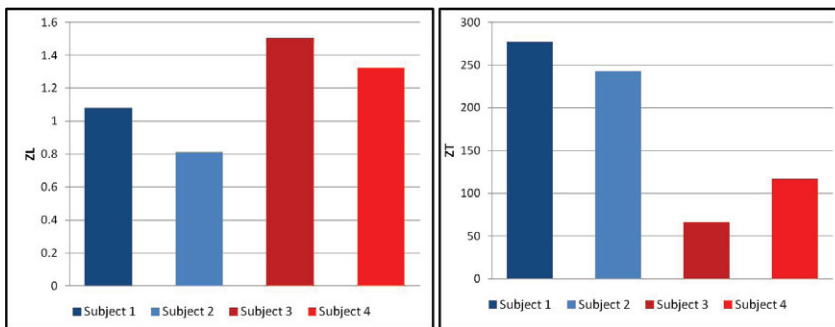


Fig 1: (Left) Value of Z_L for the four subjects. Subject 1 and 2 have E/E' < 8 (in blue) and the average value Z_L for the two is 0.9 mm Hg. s/cm⁴. Subject 3 and 4 have E/E' > 8 (in red) and the average value for Z_L is 1.4 mm Hg. s/cm⁴. (Right) Value of Z_T for the four subjects. The average value of Z_T for the two subjects with low E/E' (blue) is 260 mm Hg. s/cm² and the average value of Z_T for the subjects with high E/E' (red) is 91 mm Hg. s/cm².