

# Mechanical and histological disturbances in advanced heart failure and cardiac transplantation

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**Abstract**  
The general purpose of this thesis is to establish capability and accuracy of speckle tracking echocardiography (STE) in assessing left atrial (LA), left ventricular (LV) and right ventricular (RV) function and their correlation with myocardial fibrosis, filling pressure and clinical outcomes in advanced heart failure (HF) patients before and after heart transplantation (HT).

I demonstrated that HT recipients had impaired LV twist dynamics in the form of reduced rotation twist angle and untwist rate but time to peak twist was not different from the age matched controls and other cardiac surgical patients.

With a longitudinal study conducted on patients with refractory HF, the best prognostic power has been shown by RV strain analysis. Among the indexes of LV function, the LV ejection fraction (LVEF) demonstrated the lowest diagnostic accuracy; instead LV global circumferential strain (GCS) showed a better sensitivity and specificity than LV global longitudinal strain (GLS).

When analyzing the relationship between different severity of myocardial fibrosis and LV cavity function, the strongest function parameter that correlated with severity of myocardial fibrosis was GLS. In contrast, none of diastolic LV function or even measures of exercise capacity correlated with myocardial fibrosis.

In patients with end-stage HF, global peak atrial longitudinal strain (PALS), an index of atrial reservoir function was dependent by pulmonary capillary wedge pressure (PCWP) and LV fibrosis, but not influenced by LV systolic function. Results from this study confirm previous evidence of correlation between impaired global PALS and increased PCWP.

**Keywords**  
Advanced heart failure, heart transplantation, speckle tracking echocardiography, left ventricular function, right ventricular function, left ventricular fibrosis, left ventricular filling pressure, atrial strain.

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