Inheritance of left ventricular structure and function implies no genetic predisposition to hypertensive heart disease in Caucasian twins

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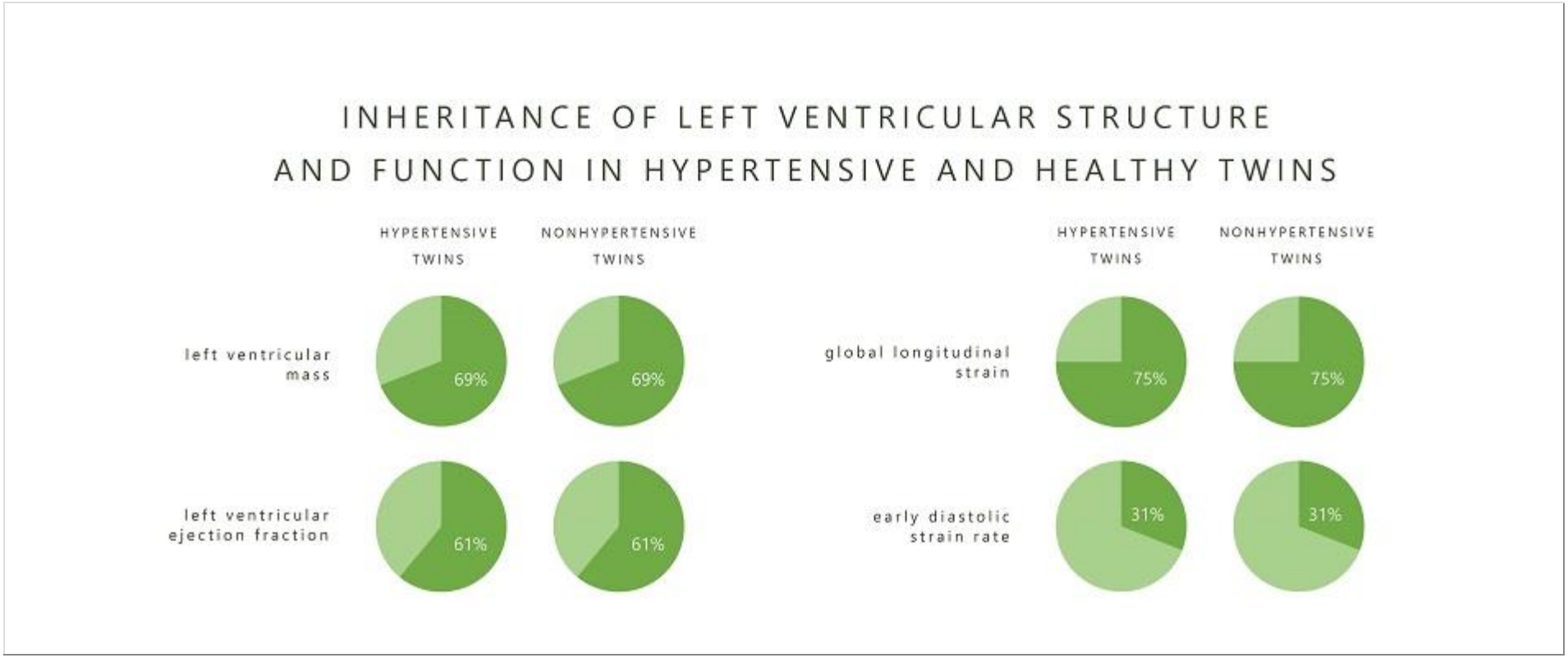
Arterial hypertension affects cardiac structure and function leading to hypertensive heart disease (HHD), which is the most common cardiac abnormality. Despite diagnostic and prognostic value of left ventricular (LV) structural and functional parameters, data on relative contribution of genetic and environmental factors are still controversial. The aim of our study was to assess the heritability of LV morphology and function, and to estimate the genetic susceptibility to HHD.

We recruited 92 Caucasian twin pairs (54 monozygotic and 38 same-sex dizygotic twin pairs, mean age 56±9 years) including 74 hypertensive siblings. Patients with obstructive coronary artery disease, any cardiomyopathy or severe valvular disease were excluded. Beyond standard echocardiographic protocol, advanced measures of LV function were performed including global longitudinal strain (GLS).

After adjusting for age, sex and hypertension, the univariate additive genetic (A), dominance genetic (D) and unique (E) environmental effects model showed 67–72% additive genetic component in the variance of LV morphological parameters, 0–46% for LV diastolic functional parameters. Systolic function showed high heritability (A: 61% for ejection fraction), with dominant genetic effect on GLS (D: 75%). Heterogeneity models revealed that there is no difference between hypertensive and non-hypertensive patients regarding heritability estimates.

LV morphology and systolic function are highly heritable. GLS shows even higher heritability suggesting dominant effects, which might be due to its inherent superior accuracy of measurement, as compared to conventional parameters. There is no difference in the heritability estimates of LV morphological and functional parameters in hypertensive and non-hypertensive twins, which suggests no genetic predisposition to HHD in this population.


INHERITANCE OF LEFT VENTRICULAR STRUCTURE
AND FUNCTION IN HYPERTENSIVE AND HEALTHY TWINS
HYPERTENSIVE TWINS
NONHYPERTENSIVE TWINS
left ventricular mass
69%
69%
left ventricular ejection fraction
61%
61%
HYPERTENSIVE TWINS
NONHYPERTENSIVE TWINS
global longitudinal strain
75%
75%
early diastolic strain rate
31%
31%