

# Magnitude of Left Ventricular Hypertrophy in Highly Trained Black Athletes

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## Background

- Differentiation of physiologic left ventricular hypertrophy (LVH) from Hypertrophic Cardiomyopathy (HCM) is crucial as the latter is responsible for up to 40% of all sudden cardiac deaths in young athletes.
- Approximately 2% of elite Caucasian athletes involved in highly endurance sports develop substantial LVH (13-15 mm) in the range that is comparable to morphologically mild HCM.
- Data regarding physiologic left ventricular remodelling in black athletes is scarce. Paradoxically, exercise-related deaths from HCM are prevalent in black athletes.
- This study compared ethnic differences in left ventricular remodelling between Caucasian and black athletes.

## Methods

Between 2005 and 2006, 140 asymptomatic and normotensive black male athletes underwent 12-lead ECG and 2D-echocardiography.

None had a known family history of HCM or premature sudden cardiac death.

### Demographics (expressed as mean ± 2SD (range))

**Age:** 20.5 ± 5.80 years (14 - 35)

**BSA:** 1.94 ± 0.16 m<sup>2</sup> (1.36 - 2.29)

**Sporting disciplines:** Soccer, Boxing, Basketball, Rugby

**Training hours (per week):** 14 hours (6 - 36)

The results were compared to those of 100 sedentary black males and 170 highly trained white male athletes matched for age, size, sport and training programs.

Echocardiographic parameters were measured in accordance with American Society of Echocardiography guidelines.

## Results

Both black athletes and white athletes had greater left ventricular dimensions than black controls.

### LV dimensions of black athletes compared with black controls Data are expressed as mean ± 2 standard deviation (range)

	Black Athletes	Black Controls	P-value
LVWTd (mm)	11.09 ± 1.65 (8 - 15)	8.96 ± 1.21 (6 - 12)	<0.001
LVIDd (mm)	52.8 ± 4.5 (46 - 62)	46.03 ± 5.24 (28-58)	<0.001

	White Athletes	Black Controls	P-value
LVWTd (mm)	10.01 ± 1.46 (7 - 14)	8.96 ± 1.21 (6 - 12)	<0.001
LVIDd (mm)	53.7 ± 4 (42 - 66)	46.03 ± 5.24 (28-58)	<0.001

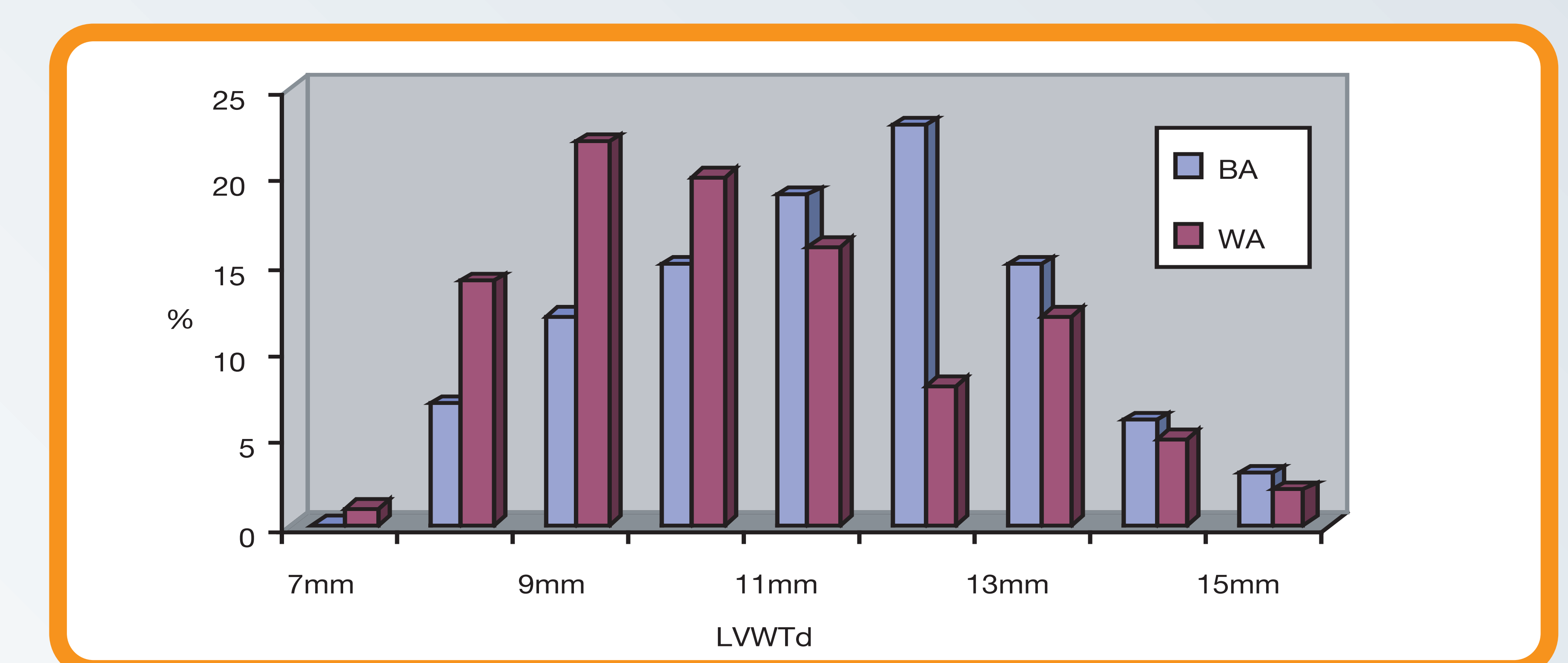
### LV dimensions of black athletes compared with white athletes

	Black Athletes	White Athletes	P-value
LVWTd (mm)	11.09 ± 1.65 (8 - 15)	10.01 ± 1.46 (7 - 14)	<0.001
LVIDd (mm)	52.8 ± 4.5 (46 - 62)	53.7 ± 4 (42 - 66)	NS

### LVWTd-Maximal left ventricular wall thickness in end-diastole

### LVIDd- Maximal left ventricular internal dimensions in end-diastole

### Distribution of Left Ventricular Wall Thickness (%) in 140 Black Athletes (BA) and 170 White Athletes (WA)



Black athletes had a greater left ventricular wall thickness (LVWT) than white athletes, amounting to a difference of 9.6%

In absolute terms 24 (17%) black athletes had a LVWT > 12 mm as compared with 9 (5%) white athletes

All black athletes with a LVWT > 12 mm had an enlarged left ventricular cavity size [54.92 ± 4.35mm (52-60)]

They also had normal indices of diastolic function on Doppler studies

E-wave (m/s)= 0.87 ± 0.2 (0.5 - 1.5)  
A-wave (m/s)= 0.45 ± 0.2 (0.17 - 1.64)  
E/A ratio= 2.32 ± 0.94 (0.8 - 6.8)

## Conclusions

- Black athletes develop modest LVH compared with non-athletes
- The magnitude of LVH in black athletes is significantly greater than in white athletes, with more black athletes having absolute values for LVWT in the region compatible with HCM than white athletes.
- The physiologic upper limits of left ventricular wall thickness and the cavity dimensions in highly trained black athletes from our study are 15mm and 62mm respectively.