

# A MORPHOMETRIC STUDY OF DOMESTIC CARNIVOROUS' HEART

Sílvia Cros Roura

UAB Faculty of Veterinary (Bellaterra), June 2016

## INTRODUCTION + AIM OF THE STUDY

Sometimes is quite difficult to determine certain pathologies using gross morphology. This is the case of several cardiomyopathies, especially in early stages of the diseases and borderline cases, which represents a diagnostic challenge.

The aim of the study is to determine a normality range of sizes, weights and thickness, both for the heart and ventricles, to diagnose heart pathologies quicker. This morphometric data can be influenced by many factors, and this study considers sex, age, and weight of the animals as a potential candidates to affect these values.

## MATERIAL AND METHODS

Total n = 52 samples			
Cat= 19 (37%)		Dog= 33 (63%)	
Female= 12	Male=7	Female= 14	Male= 19

Figure 1. Population of the study

Different data was obtained from the animals: body weight (BW) , heart weight (HW) , right ventricular weight (RV), left ventricle + septum weight (LV+S) and thickness of the walls: Right ventricle(TRV), left ventricle (TLV) and septum (TS) due to perform the following ratios: HW/BW, LV+S/HW, RV/HW, LV+S/RV, TLV/TRV and TS/TLV. The ranges were done with the mean and 2 times the standard deviation as a general approximation (in samples >10) to achieve a level of confidence of 95%.

A statistical T-student analysis was performed to determine the significance between sex and species.

## RESULTS AND DISCUSSION

Figure 2 shows the results in a general overview of the ratios HW/BW and LV+S/RV.

	HW/BW (%) ( $\bar{X} \pm 2sd$ )	(LV+S)/RV ( $\bar{X} \pm 2sd$ )
Cat	0,179-0,783	2,134-5,851
Dog < 1 year	0,322-1,269	1,851-4,755
Dog > 1 year (10kg)	0,701-1,369	
Dog > 1 year (10-30kg)	0,557-1,205	
Dog > 1 year (>30kg)	0,307-0,867	

Figure 2: HW/BW and (LV+S)/RV for cats and dogs. These are also divided by age and weight.  $\bar{X}$ =mean; sd=Standard deviation.

For adult animals, the ratio HW/BW decreases as the body weight increases. For young individuals the proportion is lower than in adults.

An established normal ratio LV+S/RV helps to determine left ventricular hypertrophy and right ventricular hypertrophy.

The range is wider in cats because of the high variability.

Figure 3 compares the thickness of the ventricles' and septum's walls:

	TLV/TRV		TS/TLV	
	$\bar{X}$	( $\bar{X} \pm 2sd$ )	$\bar{X}$	( $\bar{X} \pm 2sd$ )
Cat	3,35	1,01-5,69	1,23	0,57-1,89
Dog	2,59	0,98-4,20	1,22	0,88-1,56

Figure 3: Comparative thickness ratios for cats and dogs.

Left ventricular free wall should be 1-6 times thicker than right ventricular free wall in cats and 1-4 times in dogs.

The proportion between interventricular septum wall and left ventricular free wall should be around 1:1 for both species.

## CONCLUDING REMARKS

- No significant differences between sex are found. Otherwise, the ratio HW/BW shows variations among the age and the weight of the dogs.
- Morphometric parameters are specific of specie.
- Cats show a higher variability of the measures than dogs.
- The ratio LV+S/RV indicates left ventricular hypertrophy when it is greater than 5.8 for cats and 4.8 for dogs, with little difference among sex.
- Right ventricular hypertrophy is determined when the ratio LV+S/RV is <2,2 in both species.
- The ranges are broad but if an observation overtakes them, there is a high risk of a pathology process.
- A wider study with a greater sample size should be taken to achieve more conclusive results.

