# PREVALENCE OF PRIMARY DISEASES AND EVIDENCE OF ENDOTHELIAL DYSFUNCTION IN CATS WITH HYPERTENSION

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## Introduction

Non invasive pulse wave analysis (PWA) is nowadays available through HDO (High Definition Oscillometry) blood pressure measurement technology. Early pre-systolic amplitudes (PSA) are significant for vascular tone and help to differentiate between normal endothelial function (EF), vasodilation and vasoconstriction. Excitement and disease induced impairment of arterial compliance may be distinguished. The higher the PSA values the more they indicate a depending increase in systemic vascular resistance as expected e.g. with activation of RAAS. Angiotensin II, being a very potent vasoconstrictor, and Aldosteron, as a mediator for arterial remodeling, can be influenced by drugs like ACE-Inhibitors, Sartans and Aldosteron antagonists, respectively, which may result in an influence on PSA.

## Material and Methods

About four hundred cats were preselected from three European countries based on their history for being hypertensive. Cats were classified as such if systolic blood pressure (SBP) was 2 165 mmHg (average of 5 measurements each visit within 15 mmHg deviation) on two separate visits within 2 weeks to rule out white-coat-effect.
Additionally to blood pressure, Pulse wave analysis (PWA) was performed. Both was done using an HDO device and HDO MDS software (S+BmedVET). PSA was measured (see Figure 1) in % of the maximum (MAP = Mean arterial pressure).

### Figure 1: Normal pulse wave distribution

Data of
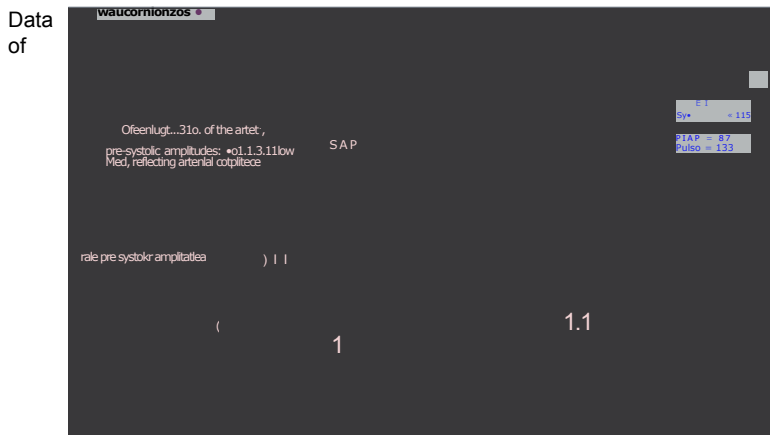


seventy-seven cats with a mean age of 13.9 (±2.6 SD) years of different breeds and sex, were evaluated. PSA results were summarized by primary disease (diagnosed reason of hypertension, Table 1).

### Table 1: Distribution of primary disease

| Primary disease | n = 77 | |
|---|---|---|
| | **n** | **%** |
| Absence of a diagnosis (idiopathic hypertension) | 21 | 27.3 |
| Renal disease | 26 | 33.8 |
| Hyperthyroidism | 19 | 24.7 |
| Early stage of heart disease | 6 | 7.8 |
| others | 6 | 7.8 |

Data were grouped by the following:
0 - 24% PSA: normal
25 - 39% PSA: stress induced increase suspected
40 - 59% PSA: activation of the RAAS very likely
> 60% PSA: clear activation of RAAS

Data of both measurements were evaluated separately and a final conclusion was drawn from the mean of both measurements if differences were not relevant.

## Results

Around 36% of the cats with CKD showed an increase in PSA in both measurements of 40-59%, 15.4% of the CKD cats showed PSA >60% (Table 2). Cats with PSA >60% were not treated so far. Cats treated with ACE inhibitors showed PSA of less than 60%.

### Table 2: PSA - cats with renal disease

| | 1. Measurement | | 2. Measurement | | Mean |
|---|---|---|---|---|---|
| | n | % | n | % | |
| 0-24% | 3 | 11.5 | 6 | 23.1 | **17.3** |
| 25 - 39% | 10 | 38.5 | 6 | 23.1 | **30.8** |
| 40 - 59% | 9 | 34.6 | 10 | 38.5 | **36.5** |
| > 60% | 4 | 15.4 | 4 | 15.4 | **15.4** |
| Differences to 100% due to rounding | | | | | |

Elevated PSA were also seen in animals with other diseases, influencing EF (diabetes, hyperthyroidism, etc.). In cats with idiopathic hypertension PSA varied more between the two measurements (Table 3). Eight animals (38.1%) showed stable PSA 240% in both measurements, while an increase in PSA was found in 14.3% (3 animals). In 28.6% (6 animals) of the animals the PSA decreased in the second measurement which indicated an influence of excitement at the previous visit.

### Table 3: PSA - cats with idiopathic hypertension

| | 1. Measurement | | 2. Measurement | |
|---|---|---|---|---|
| | n | % | | n |
| 0-24% | 0 | 0.0 | 2 | 9.5 |
| 25 - 39% | 5 | 23.8 | 8 | 38.1 |
| 40 - 59% | 14 | 66.7 | 6 | 28.6 |
| > 60% | 2 | 9.5 | 5 | 23.8 |

## Conclusion

These results show for the first time that the non-invasive evaluation of **EF** is possible with HDO-PWA. Hypertensive cats with CKD have clearly higher PSA than cats with other underlying diseases. In the group of cats with idiopathic hypertension, stable PSA values 40°/o and the increase of PSA respectively may support the prevalence of an underlying disease in early stage. These animals will need further follow up to later identify the disease.

## References

B. Egner: Non invasive pulse wave analysis: assessing arterial compliance and prognosis of kidney disease. ECIVM 2012, Maastricht, NL