EFFICACY OF AMLODIPINE ON ENDOTHELIAL DYSFUNCTION IN CATS WITH HYPERTENSION

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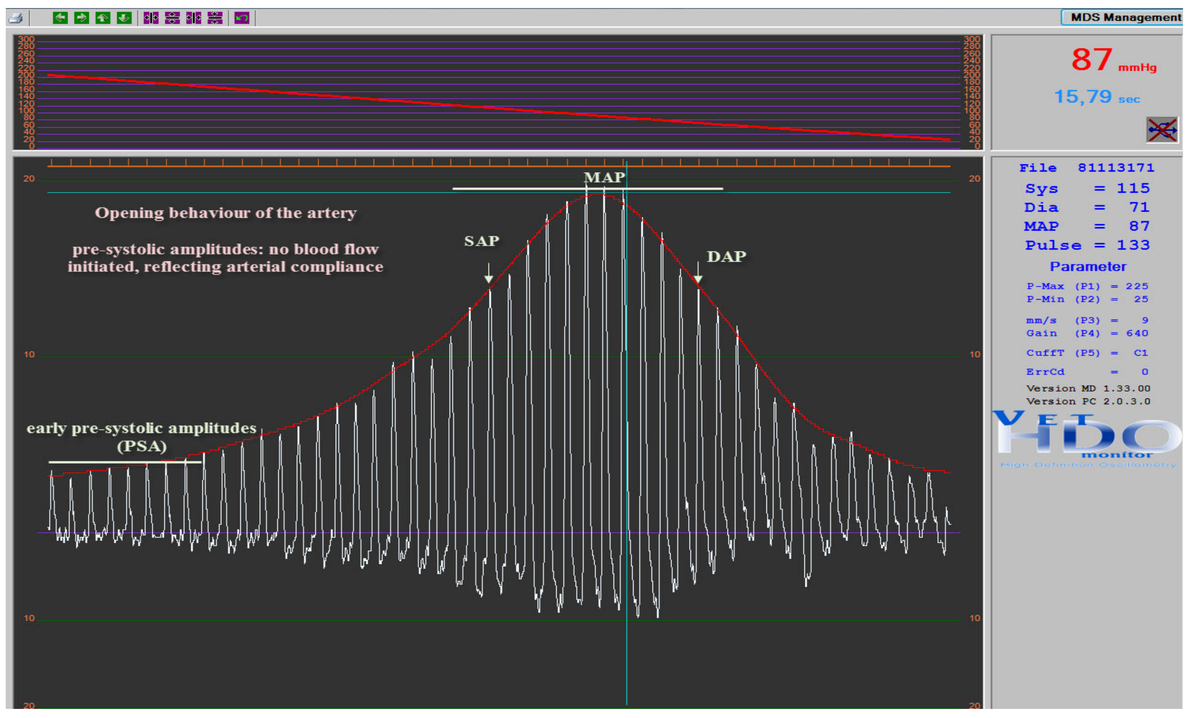
Introduction

Non invasive pulse wave analysis (PWA) through HDO (High Definition Oscillometry) helps to differentiate between normal endothelial function (EF), vasodilation and vasoconstriction (Egner, 2012). The higher the pre-systolic amplitude (PSA) values the more they indicate a depending increase in systemic vascular resistance, seen in cats with chronic kidney disease (CKD) or other disorders influencing the endothelial function. PSA will be measured (see Figure 1) in % of the maximum (MAP = Mean arterial pressure). It could be shown that hypertensive cats with CKD and other underlying diseases have increased PSA values (Adler et. al., 2013).

Amlodipine is a peripheral arterial vasodilator, binding at the L-type Ca2+ channels, inhibiting Ca influx, leading to a reduction in peripheral vascular resistance and reduction in blood pressure. Amlodipine is shown to be effective and safe in cats with hypertension (Huhtinen et. al., 2014).

Figure 1: Pulse Wave Analysis (PSA = % of MAP)



Material and Methods

Seventy-four hypertensive cats from three European countries with known underlying primary disease were randomly treated with amlodipine (0.125 mg/kg) or placebo for 28 days. Cats were classified as hypertensive if systolic blood pressure (SBP) was ≥ 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. The dose was adapted to 0.25 mg/kg on day 14 if the cat had not responded (a responder was defined as a decrease of SBP to ≤ 150 mmHg or a decrease of at least 15%). On day 28, the placebo cats were switched to amlodipine and adapted after 14 days, if needed.

Additionally to blood pressure, pulse wave analysis (PWA) was performed. Both was done using an HDO device and HDO MDS software (S+BmedVET).

Data were grouped by the following PSA ranges:

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

Results

The hypertension was associated with CKD in 35.1% and hyperthyroidism in 24.3% of the cats. 25.7% of the hypertensive cats were diagnosed having idiopathic hypertension (IH).

On day 28 the number of cats with PSA of 40% or higher decreased from 50% to 0% in the amlodipine treated group, compared to 66.6% to 50% in the placebo group (see Table 1, values PSA 40-59% and ≥ 60% added).

Table 1: PSA development in cats with CKD

CKD n = 26	Baseline				Day 28			
	Amlodipine		Placebo		Amlodipine		Placebo	
	n	%	n	%	n	%	n	%
0 – 24%	2	14.3	1	8.3	8	57.1	3	25
25 – 39%	5	35.7	3	25	6	42.9	3	25
40 - 59%	5	**35.7**	7	**58.3**	0	**0**	6	**50**
≥ 60%	2	**14.3**	1	**8.3**	0	**0**	0	**0**

Differences to 100% due to rounding

Hyperthyroidism cats showed similar results (62.5% to 12.5% for amlodipine, and 20% to 50% for placebo, see Table 2, values PSA 40-59% and ≥ 60% added). In cats with IH a decrease was seen in both groups (70% to 20% for amlodipine and 100% to 33.3% for placebo).

Table 2: PSA development in cats with hyperthyreoidism

Hyper-tyreoidism n = 18	Baseline				Day 28			
	Amlodipine		Placebo		Amlodipine		Placebo	
	n	%	n	%	n	%	n	%
0 – 24%	0	0	0	0	3	37.5	4	40
25 – 39%	3	37.5	8	80	4	50	1	10
40 - 59%	5	**62.5**	1	**10**	1	**12.5**	5	**50**
≥ 60%	0	**0**	1	**10**	0	**0**	0	**0**

Conclusion

The results show the first time that amlodipine may not only lower blood pressure but also effects PSA in cats with CKD and hyperthyreoidism. Further studies are recommended to strengthen the present results.

References

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