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MARKERS OF OXIDATIVE STRESS IN DOGS WITH MYXOMATOUS MITRAL VALVE DISEASE

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INTRODUCTION

- Myxomatous mitral valve disease (MMVD) leading to mitral regurgitation (MR) is the most common heart disease in dogs; Cavalier King Charles Spaniels (CKCS) are predisposed. Aetiology remains poorly understood.
- Oxidative stress is an imbalance between production of reactive oxygen species and antioxidant defences in the body causing tissue damage.
- Oxidative stress has been associated with heart disease in people with MR.
- Only few previous studies have evaluated markers of oxidative stress in dogs with MMVD.

OBJECTIVE

- Determine plasma concentrations of the following markers of oxidative stress
  - Malondialdehyde (MDA)
  - Oxidized low-density lipoprotein (oxLDL)
  - Vitamin E (α-tocopherol and γ-tocopherol)
- Investigate if these markers were associated with MMVD severity, certain clinical variables and Troponin-I in dogs with no or different severities of MMVD.

MATERIALS AND METHODS

89 client-owned dogs allocated into 5 groups (Table 1) based on MMVD severity according to the American College of Veterinary Internal Medicine (ACVIM) guidelines:

- **Control** Healthy, non-predisposed dogs (Beagles)
- **Group A** CKCS, no heart murmur, normal echocardiogram
- **Group B1** CKCS, heart murmur or MR>20%, normal size left atrium (LA)
- **Group B2** CKCS, heart murmur or MR>20%, enlarged LA
- **Group C** Various breeds, Congestive heart failure (CHF)

Data was analysed using multiple regression analysis models. A value of $P<0.05$ was considered significant.

RESULTS

- Plasma oxLDL was lower in control Beagle dogs compared to CKCS (overall $P=0.0005$) (Fig.1).
- Plasma oxLDL was lower in females compared to males ($P=0.007$) (Fig.1).
- Plasma vitamin E were associated with body condition score (α-tocopherol, $P=0.002$; γ-tocopherol, $P=0.01$). However, the associations disappeared when adjusting for serum cholesterol concentration (Fig. 2).
- Plasma MDA, oxLDL and vitamin E were not associated with MMVD severity, age, sex, passive smoking or Troponin-I in CKCS.

SUMMARY AND CONCLUSIONS

- Beagles appear to have lower plasma concentrations of oxLDL than CKCS.
- The results cannot confirm a role of oxidative stress in dogs with MMVD.
- MDA, oxLDL and vitamin E may not be optimal markers for assessing oxidative stress in dogs with MMVD.

ACVIM group	Control	A	B1	B2	C
Total number	14	14	27	18	16
Sex (f/m)	9/5	7/7	18/9	9/9	2/14
Age (years)	7.5 [5.7;8.7]	4.8 [4.2;5.9]	6.5 [6.0;7.8]	7.5 [5.3;8.4]	11.0 [9.6;12.9]
BCS (3+4/5/6+7)	0/11/3	4/7/3	5/10/11	4/8/6	2/4/8
BW	14.7 [12.3;15.7]	8.3 [7.6;8.8]	9.4 [7.9;10.5]	9.1 [8.4;10.4]	11.0 [9.9;13.1]
Troponin-I (µg/L)	0.01 [0.01;0.03]	0.01 [0.01;0.02]	0.03 [0.01;0.03]	0.03 [0.01;0.04]	0.04 [0.03;0.08]
Cholesterol (mmol/L)	5.6 [4.7;6.7]	5.3 [5.0;7.4]	6.4 [5.3;8.0]	6.2 [4.7;6.8]	7.4 [6.4;8.8]

Table 1. Dog characteristics in the different American College of Veterinary Internal Medicine (ACVIM) groups. Values reported are median and interquartiles.

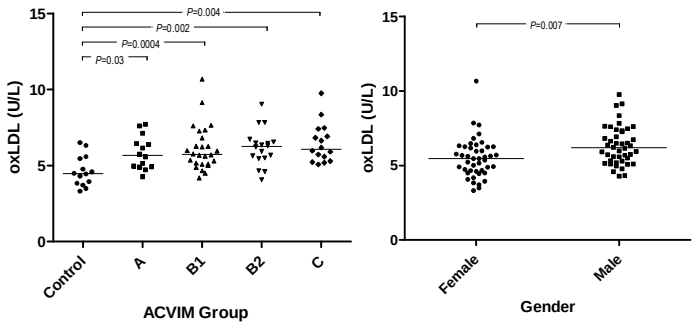

Figure 1. Raw data plot of plasma oxidized low-density lipoprotein (oxLDL) concentration in the different American College of Veterinary Internal Medicine (ACVIM) groups and the association between oxLDL concentration and gender.

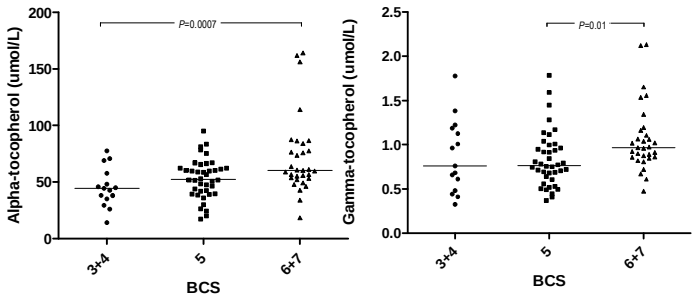

Figure 2. Raw data plot of α-tocopherol and γ-tocopherol concentration in the different body condition score (BCS) groups.

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