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Short communication

# Association between decreased blood pressure and azotaemia in canine babesiosis

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## Abstract

Acute tubular necrosis (ATN) was described in canine babesiosis. Hypotension is considered as one of the factors which influence the development of hypoxic renal damage. In this study hypotension defined as mean arterial pressure (MAP) < 80 mmHg was detected in 7 out of 48 dogs (14.6%) infected with *Babesia canis*. Lower systolic arterial pressure (SAP), diastolic arterial pressure (DAP) and MAP were detected in azotaemic dogs infected with *B. canis*. Statistically significant negative correlations between blood pressures (SAP, DAP and MAP) and serum creatinine and urea concentrations showed the influence of decreased blood pressure on the development of azotaemia and is probably also associated with ATN in canine babesiosis.

**Key words:** azotaemia, canine babesiosis, hypotension

## Introduction

Acute tubular necrosis (ATN) was described in dogs infected with *Babesia canis* in Hungary treated with imidocarb (Máthé et al. 2007). The authors of that work suspected hypoxic injury as a cause of the ATN. This pathology might result from severe anaemia, deficit of haemoglobin, hypotension or nephrotoxicity of imidocarb (Máthé et al. 2007).

In this study the authors have investigated the influence of blood pressure changes on azotaemia in dogs infected with *B. canis* before treatment with imidocarb.

## Materials and Methods

Forty eight serum and blood samples of dogs infected with *B. canis* were collected before treatment (group A). Thirty three clinically healthy dogs were used as a control group (group B). Blood pressure was measured in dogs from group A and B using a non-invasive oscillometric technique (Cardell veterinary monitor 9405, Midmark, USA) during the first visit to the clinic, before treatment and blood sample collection. Diagnosis of infection with *B. canis* was based on the results of blood smear examination and confirmed by the PCR method described in previous work

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Table 1. Differences in comparison of SAP, DAP and MAP in groups A (babesiosis) and B (healthy dogs) and subgroups A1 (azotaemic) and A2 (non-azotaemic).

Parameter	Group	Mean	Standard deviation	Min. – Max.	<i>p</i>
SAP (mmHg)	A	120.9	27.7	77 – 190	0.04306
	B	131.1	7.2	118 – 146	
	A1	109.5	26.6	77 – 172	0.00487
	A2	131.4	24.7	97 – 190	
DAP (mmHg)	A	68.0	20.8	38 – 120	0.00002
	B	85.9	11.0	67 – 113	
	A1	59.8	19.9	40 – 109	0.00753
	A2	75.5	19.1	38 – 120	
MAP (mmHg)	A	97.3	23.2	58 – 170	0.00007
	B	115.1	8.7	95 – 132	
	A1	89.3	21.6	58 – 138	0.02152
	A2	104.6	22.6	65 – 170	

Table 2. Correlations between blood pressures (SAP, DAP and MAP) and serum concentrations of blood urea and creatinine in 48 dogs infected with *B. canis*.

Correlation	<i>r</i>	<i>p</i>	
Blood urea	SAP	-0.5089	0.000
	DAP	-0.4454	0.002
	MAP	-0.4478	0.001
Creatinine	SAP	-0.3822	0.007
	DAP	-0.3930	0.006
	MAP	-0.3294	0.022

*r* – Pearson's correlation coefficient, *p* – a value of *p*.

(Zygner and Wędrychowicz 2009). Serum creatinine and urea concentrations were determined using a clinical chemistry analyser (XL 640, Erba Mannheim, Germany). Dogs with both serum urea and creatinine concentrations above reference intervals were considered azotaemic. The results obtained allowed us to divide the infected dogs into two subgroups: subgroup A1 (azotaemic) and A2 (non-azotaemic). The results were analysed using Statistica 10. Student's *t*-test was used to compare systolic arterial pressure (SAP), diastolic arterial pressure (DAP) and mean arterial pressure (MAP) between groups A and B, and between subgroups A1 and A2. Pearson's correlations between blood pressures (SAP, DAP and MAP) and serum concentrations of urea and creatinine were calculated. The value of *p* < 0.05 was considered significant.

## Results and Discussion

Azotaemia was present in 47.9% of infected dogs (group A1; 23 out of 48 dogs). Mean serum creatinine

and urea concentration ± standard deviation (SD) in this group amounted to 3.97 mg/dl ± 2.59 and 255.39 mg/dl ± 107.52 respectively. Twenty five out of forty eight infected dogs were non-azotaemic (group A2; 52.1%). Mean serum creatinine and urea concentration ± SD in this group amounted to 1.14 mg/dl ± 0.28 and 38.12 ± 5.63 respectively. Hypotension defined as MAP < 80 mmHg (Matijatko et al. 2009) was detected in 7 dogs infected with *B. canis* (14.6%; 6 in subgroup A1 and 1 in subgroup A2). Comparisons of blood pressures between dogs from group A and B and between dogs from subgroup A1 and A2 showed lower SAP, DAP and MAP in dogs from group A and subgroup A1 and were statistically significant (Table 1). These results showed the influence of infection on the development of hypotension in canine babesiosis and are in agreement with previous research (Jacobson et al. 2000, Matijatko et al. 2009). Hypotension in canine babesiosis may result from myocardial damage or vasodilatation (Matijatko et al. 2009). Moreover, lower SAP, DAP and MAP in subgroup A1, and statistically significant negative correlations between these

parameters and serum creatinine and urea showed the influence of hypotension on azotaemia in dogs infected with *B. canis* (Table 2). The results of this study may confirm the supposition of Máthé et al. (2007) that renal hypoxic damage and ATN in canine babesiosis result from hypotension.

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