

Studies on the clinical significance of  
N-terminal pro-atrial natriuretic peptide in dogs

Abstract of Doctoral Thesis

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Studies have reported that the concentration of plasma N-terminal pro-atrial natriuretic peptide (NT-proANP) increases with a progression of cardiac disease in dogs. However, insufficient studies exist on plasma NT-proANP concentration. Also, influencing factors affecting this concentration remain unclear. Additionally, the clinical usefulness of plasma NT-proANP concentration has not been compared with other cardiac biomarkers (CBs) in dogs. Therefore, this study investigated causes of variation in plasma NT-proANP concentration and their clinical significance in dogs.

First, we evaluated the effect of diet and diurnal variations on plasma NT-proANP concentration in clinically healthy dogs. Autonomic nerve system functions were then investigated to determine whether autonomic function was involved in diurnal variations and if it affected plasma NT-proANP concentration. Results showed that the diet had no effect on plasma NT-proANP concentration. Also, although no statistically significant difference in plasma NT-proANP concentration at different time points was observed, it was proposed that plasma NT-proANP concentration increased when the sympathetic nerve activity increased. Subsequently, plasma NT-proANP concentration was assessed to discover the effect of dehydration on its concentration. As observed, plasma NT-proANP concentration underestimated the severity of cardiac diseases in dehydrated dogs.

Second, the glomerular filtration rate (GFR) was evaluated to investigate the effect of plasma NT-proANP concentration in dogs that were subjected to plasma iohexol clearance test. Results showed that the plasma NT-proANP concentration was affected only when GFR was severely reduced.

Third, we evaluated characteristics and discriminatory abilities of using plasma NT-proANP, NT-proB-type natriuretic peptide (NT-proBNP), ANP, and cardiac troponin I (cTnI) concentrations to discriminate between cardiac dilatation and congestive heart failure (CHF) in dogs with myxomatous mitral valve disease (MMVD). Results showed that plasma NT-proANP, NT-proBNP, and ANP concentrations increased with left atrial enlargement, regardless of the presence or absence of clinical signs. Both plasma NT-proANP and NT-proBNP concentrations were also associated with left atrial enlargements, and their discriminatory abilities against cardiac dilatation and CHF were comparable.

Finally, we investigated the usefulness of plasma NT-proANP and NT-proBNP

concentrations in differentiating the cause of coughing in dogs diagnosed with MMVD without signs of CHF and in dogs diagnosed with respiratory diseases. Results showed that the ability of these two CBs to discriminate the cause of cough was comparable.

Conclusively, plasma NT-proANP concentration is proposed to increase with increasing sympathetic nerve activity and is influenced by dehydration and GFR. Therefore, the clinical usefulness of plasma NT-proANP concentration for diagnosing MMVD was considered comparable to that of plasma NT-proBNP concentration, which is currently the most widely used in clinical practice. Moreover, these CBs differentiated between causes of coughing in dogs with MMVD without signs of CHF and those with respiratory diseases.