Evaluation of biomarkers N-terminal pro-B-type natriuretic peptide and troponin-I in healthy Labrador retrievers and Labrador retrievers with subclinical dilated cardiomyopathy

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Introduction

Cardiovascular disease in dogs may have minimal outward signs in the beginning stages, but early detection and intervention are vital to help affected dogs live longer and have better quality of life[1]. N-terminal pro-B-type natriuretic peptide (NT-proBNP) and troponin-I are two biomarkers that show promise for detection of cardiovascular disease at a research level, but a deeper understanding is necessary to bring them into the forefront for diagnostic purposes[2]. The aim of this research was to present values of NT-proBNP and troponin-I in healthy Labrador retrievers and in Labrador retrievers with subclinical dilated cardiomyopathy (subDCM).

Materials and Methods

Animals and Housing

- All dogs selected from colony of Labrador retrievers at Four Rivers Kennel
- 55 Labrador retrievers (27m/28f; 1-10yrs)
- All dogs housed in temperature controlled individual kennels overnight and aired outside in social groups for appx 6hrs daily
- Water was provided *ad libitum* via automatic waterers
- All dogs fed a standard chicken and rice diet for at least 60 days prior to testing

Experimental Design

- Each dog had jugular venipuncture pre plasma collected for NT-proBNP analysis (Cardiopet; Idexx) and serum collected for troponin-I analysis (Immulite; UC Davis Vet Lab).
- Each dog had an echocardiogram performed by an experienced sonographer which was reviewed by a boarded veterinary cardiologist.
- Transthoracic 2-dimensional (2D), M-mode, color flow, and spectral Doppler echocardiographic evaluations were performed using a Samsung HM70s Plus portable ultrasound machine with a P3-8 (3-8Mhz) phased array transducer.
- All dogs were shaved on the right of the chest and were conscious during scanning, placed in right lateral recumbency to obtain standard right parasternal views. Any dogs which showed abnormalities were then placed in left lateral recumbency to obtain additional views.

Results and Discussion

Rates of Subclinical DCM

Out of 55 adult Labrador retrievers, 46 (24m/22f) were classified as normal and 9 (3m/6f) were classified as having occult subDCM. Female Labrador retrievers had substantially higher rates of subDCM.

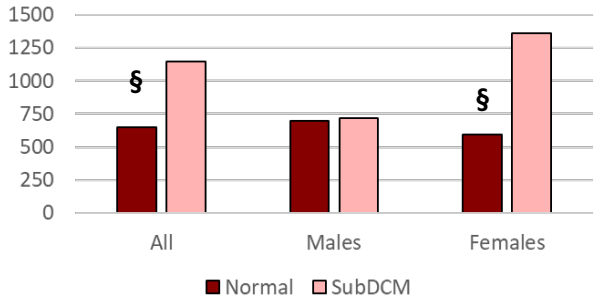
NT-proBNP

Normal Labrador retrievers had a significantly lower mean NT-proBNP compared to subDCM Labrador retrievers ($p<0.001$). Normal female Labrador retrievers had significantly lower NT-proBNP than subDCM Labrador retrievers ($p<0.001$), likely in part due to low numbers of diagnosed males. Labrador retrievers with subDCM tended to have NT-proBNP levels above the reference range of 900 pmol/L.

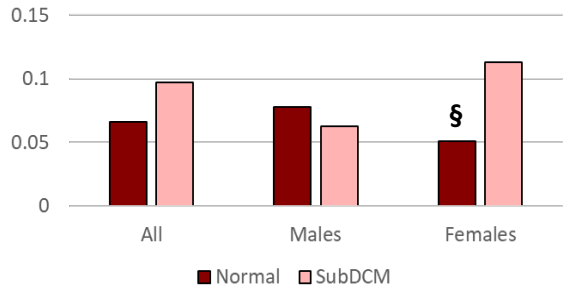
Troponin-I

Normal Labrador retrievers had a lower mean troponin-I compared to subDCM Labrador retrievers, trending towards significance ($p=0.08$). Normal female Labrador retrievers had significantly lower troponin-I compared to subDCM Labrador retrievers ($p=0.005$). No dog had troponin-I levels above the reference range of 0.17 ng/ml.

NT-proBNP in Labrador retrievers



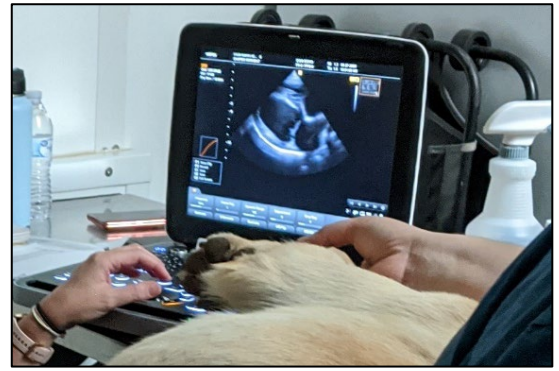
Troponin-I in Labrador retrievers

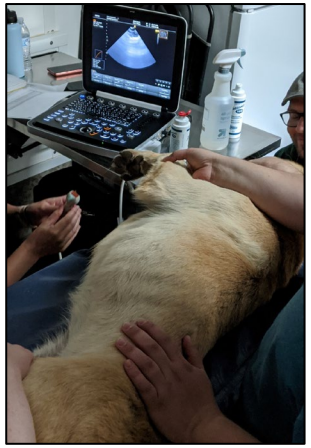


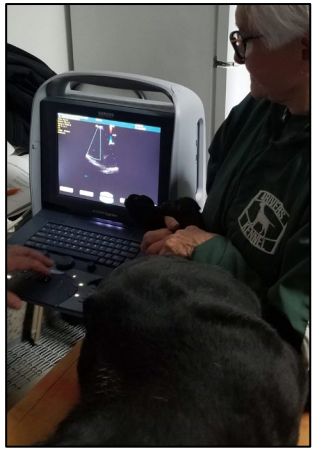
§ Significant difference between groups ($p<0.05$)

NT-proBNP and Troponin-I Levels in Labrador retrievers

		Normal	SubDCM	P-value
NT-proBNP (pmol/L)	All	647 ± 50	1144 ± 113	<0.001
	Males	696 ± 63	716 ± 179	0.914
	Females	592 ± 71	1358 ± 132	<0.001
Troponin-I (ng/ml)	All	0.066 ± 0.007	0.097 ± 0.016	0.088
	Males	0.078 ± 0.01	0.063 ± 0.029	0.631
	Females	0.051 ± 0.009	0.113 ± 0.018	0.005







Conclusion

In summary, healthy Labrador retrievers had significantly lower NT-proBNP compared to Labrador retrievers affected with subclinical dilated cardiomyopathy. Troponin-I levels were also significantly lower in normal Labrador retriever females compared to Labrador retriever females affected with subclinical dilated cardiomyopathy. Both biomarkers, but especially NT-proBNP, may prove to be useful in screening for early cardiovascular disease in canines.

References

[1]Oyama, M.A. (2013) Using Cardiac Biomarkers in Veterinary Practice. *Vet Clin Small Anim*, 43, 1261-1272.

[2]Ettinger, S.J., Farace G., Forney S.D., Frye M., Beardow A. (2012) Evaluation of plasma N-terminal pro-B-type natriuretic peptide concentrations in dogs with and without cardiac disease. *J Am Vet Med Assoc*, 240, 171-180.