

Getting the Most of Your Baseline Lab Work: The Role of NT-proBNP in Wellness and Risk Assessment

presented by dvm360



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Summary

In November of 2021, Elizabeth Rozanski, DVM, DACVIM, DACVECC along with dvm360 discussed clinical applications for N-terminal pro-brain natriuretic peptide (NT-proBNP) in-clinic testing for feline and canine patients.

Cardiologists

- Each DACVIM cardiologist is responsible for about-
 - 250,000 dogs
 - 220,000 cats
- Cardiologists are pricey and hard to schedule appts. with... (but very useful!)
- We need more ways to sort out better heart disease

Overview

- What is NT-proBNP
- What is known?
- Where can it help you?
- What are some limitations?
- Scenarios that NT-proBNP would be helpful

NT-proBNP and BNP

- Biomarker – measurable substance in an organism that changes in response to a condition or exposure
 - Creatinine, troponin, carboxyhemoglobin
 - Natriuretic peptides are released when there is atrial stretch with the biological goal to help promote return to normal volume
 - BNP = brain natriuretic peptide

- NT-proBNP = N-terminal pro brain natriuretic peptide

NT-proBNP in Veterinary Medicine

- Häggström J, Hansson K, Kwart C, Pedersen HD, Vuolteenaho O, Olsson K. Relationship between different natriuretic peptides and severity of naturally acquired mitral regurgitation in dogs with chronic myxomatous valve disease. J Vet Cardiol. 2000 May;2(1):7-16.
- ANP (atrial natriuretic peptide)
- BNP
- NT-proBNP

NT-proBNP

- Early 2000-2010
 - Variety of studies in dogs and cats that established that NT-proBNP is reliably increased with atrial stretch and the values are relatively proportional to degree of disease
 - IDEXX developed and marketed test; quantitative plasma; initially required special tube and handling
 - ANTECH focused more on BNP, less clinical trials

How Is NT-proBNP Available?

- Sent out test- quantitative (IDEXX laboratories)
- Qualitative point-of-care test (cats only/IDEXX)
- Cardio BNP (Antech)*
- POINT-OF-CARE quantitative result (Bionote Vcheck)

Cats

- Wess G, Daisenberger P, Mahling M, Hirschberger J, Hartmann K. Utility of measuring plasma N-terminal pro-brain natriuretic peptide in detecting hypertrophic cardiomyopathy and differentiating grades of severity in cats. *Vet Clin Pathol*. 2011 Jun;40(2):237-44.
- Cats with NT-proBNP > 100 pmol/L should have an echocardiogram
- HIGHER values are proportional to more disease

Cats – Using NT-proBNP in Cats with Respiratory Signs Helps Practitioners

- Singletary GE, Rush JE, Fox PR, Stepien RL, Oyama MA. Effect of NT-pro-BNP assay on accuracy and confidence of general practitioners in diagnosing heart failure or respiratory disease in cats with respiratory signs. *J Vet Intern Med*. 2012 May-Jun;26(3):542-6.
- Cat films are HARD
- GP were much more accurate and felt better about the diagnosis of heart or not heart if also given an NT-proBNP result

Cats

- Lu TL, Côté E, Kuo YW, Wu HH, Wang WY, Hung YW. Point-of-care N-terminal pro B-type natriuretic peptide assay to screen apparently healthy cats for cardiac disease in general practice. *J Vet Intern Med*. 2021 Jul;35(4):1663-1672.
- Point-of-care test was less sensitive in all cats; if elevated= heart disease, but some cats with normal values still had some cardiac disease

- Cats with murmurs was more helpful for discriminating presence of heart disease than “all cats” by use of NT-proBNP

Other Point-of-Care Options

- Loughran KA, Rush JE, Rozanski EA, Oyama MA, Larouche-Lebel É, Kraus MS. The use of focused cardiac ultrasound to screen for occult heart disease in asymptomatic cats. *J Vet Intern Med*. 2019 Sep;33(5):1892-1901.
- Combine POC ultrasound with NT-proBNP
- <https://www.youtube.com/watch?v=l4U8AoxYmok>

How About with Steroids?

- Block CL, Oyama MA. Echocardiographic and biomarker evidence of plasma volume expansion after short-term steroids administered orally in cats. *J Vet Intern Med*. 2020 Jan;34(1):29-34.
- Cats receiving oral steroids had increases in NT-proBNP, consistent with volume expansion
- Ployngam T, Tobias AH, Smith SA, Torres SM, Ross SJ. Hemodynamic effects of methylprednisolone acetate administration in cats. *Am J Vet Res*. 2006 Apr;67(4):583-7. doi: 10.2460/ajvr.67.4.583. PMID: 16579749.

Cats Consensus Statement

- Luis Fuentes V, Abbott J, Chetboul V, Côté E, Fox PR, Häggström J, Kittleson MD, Schober K, Stern JA. ACVIM consensus statement guidelines for the classification, diagnosis, and management of cardiomyopathies in cats. *J Vet Intern Med*. 2020 May;34(3):1062-1077.
- **A point-of-care NT-proBNP assay** provides rapid results while maintaining reasonable diagnostic accuracy in discriminating between cardiac and non-cardiac causes of respiratory distress and should be considered when point-of-care ultrasound examination is not available (LOE medium).

Cats Consensus Statement

- Renal disease will increase values so in the presence of azotemia, interpretation may be challenging
- Hyperthyroidism can potentially increase values as well

Cats Cases

- Salt
- Wyatt
- Acadia
- Sir Purrsalot

Salt

- 8-year FS Domestic Shorthair
- Her brother Pepper died acutely of a saddle thrombus 2 months after his wellness exam
- Review of record of Pepper and Salt no murmur ever heard
- Now she is worried about Salt

Use of NT-proBNP: Salt

- > 100 pmol/L= advise more complete diagnostics
- < 100 pmol/L= Recheck 6-12 months or if clinical signs change

Wyatt

- 6-year-old DSH cat
- Presents to you with lethargy

Wyatt – What Do You Do?

- To make him feel better
 - Oxygen
- To figure out what is going on?
 - X-rays
 - Echo?
 - Lab work

Point-of-Care NT-proBNP: Wyatt

- 623 pmol/L
- You can be super comfortable this is heart disease

- Stabilize with diuretics; pursue more testing as you like

Acadia

- 4-year-old Maine Coon Cat
- Has been coughing!
- Owners are convinced it is heart failure since they know MC get heart disease

Sir Purrsalot

- 8-year-old Persian
- Moderate dental disease
- Owner is scared of anesthesia
- Has been saving up for dental for 18 months
- Pre- anesthetic exam- 3/6 murmur and intermittent gallop. Good pulses
- EKG, chest X-ray and lab work looks good

Sir Purrsalot

- * this is key patient an NT-proBNP can help you with
- Likely MUCH more helpful that cat EKG,CBC, and Chest Rads
- If NT-proBNP is elevated; dental should be postponed
- If NT-proBNP is normal, you can be much more comfortable that not a cardiac risk associated with anesthesia

Anything Else?

- Pierce KV, Rush JE, Freeman LM, Cunningham SM, Yang VK. Association between Survival Time and Changes in NT-proBNP in Cats Treated for Congestive Heart Failure. J Vet Intern Med. 2017 May;31(3):678-684.
- **Helpful in monitoring progression**
- Cats with a bigger decrease from admission to discharge had a better long-term survival

Summary of NT-proBNP Use in Cats

- General health screening

- Pre-anesthetic
- Deciding about cough/shortness of breath/murmur
- Cardiologist extenders
- Referral recommendations
- Modifying drugs in patients in CHF?

How About Dogs?

- Chronic bronchitis/airway failure
- Acquired heart disease
 - Mitral valve disease
 - Dilated cardiomyopathy

Small Breed Dogs with Mitral Murmur and Cough – Classic Thinking

Lungs

- Sinus arrhythmia
- Softer murmur
- No weight loss

Heart

- Sinus tachycardia
- Louder murmur
- Weight loss or decreased appetite

Small Breed Dogs

- Can have both!
- Can have initially asymptomatic heart disease that progresses to heart failure

What Do You Think When You First Hear a Murmur?

- Nothing (Free)
- Chest radiographs to look for cardiac enlargement (\$2-300)
- NT-proBNP testing. (\$15 +cost of machine for point of care)

- Echo. (\$600-900)

EPIC Study

- Boswood A et al. Effect of Pimobendan in Dogs with Preclinical Myxomatous Mitral Valve Disease and Cardiomegaly: The EPIC Study-A Randomized Clinical Trial. J Vet Intern Med. 2016 Nov;30(6):1765-1779.
- Earlier treatment with pimobendan helps delay the onset to CHF

NT-proBNP Over Time

- Borgarelli M * The predictive value of clinical, radiographic, echocardiographic variables and cardiac biomarkers for assessing risk of the onset of heart failure or cardiac death in dogs with preclinical myxomatous mitral valve disease enrolled in the DELAY study. J Vet Cardiol. 2021 Aug;36:77-88.
- NT-proBNP >1500 was predictive of the onset of CHF

DELAY study looked at benazepril/spironolactone in pre-clinical DVMD

In a Dog with Suspected MMVD

- Clinical examination every 6-9 months
- Teach family to measure resting respiratory rate
- Monitor NT-proBNP is starts to > 1500 consider ECHO

How About DCM?

- Breeds at risk – Dobies, Boxer, Bulldogs most commonly
- BEG diet changing the landscape a bit
- Early treatment can be very helpful in prolonging quality of life!

Dobermans

- Singletary GE, Morris NA, Lynne O'Sullivan M, Gordon SG, Oyama MA. Prospective evaluation of NT-proBNP assay to detect occult dilated cardiomyopathy and predict survival in

Doberman Pinschers. J Vet Intern Med. 2012 Nov-Dec;26(6):1330-6.

- Elevated NT-proBNP helpful to detect early DCM
- Check it in apparently healthy Dobermans!

Boxers

- Baumwart RD, Meurs KM. Assessment of plasma brain natriuretic peptide concentration in Boxers with arrhythmogenic right ventricular cardiomyopathy. Am J Vet Res. 2005 Dec;66(12):2086-9.
- Less helpful until progresses
- Boxers get arrhythmia more before remodeling, but can progress to CHF
- Worth checking, but consider HOLTER a better test

Monitoring Progression

- NT-proBNP is useful to help titrate medications, and potentially to be predictive of outcome
- Check with starting therapy and then at each recheck visit

Breed Variation

- Sjöstrand K et al. Breed differences in natriuretic peptides in healthy dogs. J Vet Intern Med. 2014 Mar-Apr;28(2):451-7.
- Healthy Labs and Newfies HIGHER than G.Shep and dachshunds
- Chance that moderate elevation in dog is actually normal for that breed

Potential Interference in Dogs

- Severe pulmonary hypertension
- Azotemia
- Critical illness (Sepsis/GDV)
- Post arrest (myocardial stunning)
- As always, look at the whole picture

Summary in Dogs

- Monitor NT-proBNP in dogs with suspected mitral valve disease
- Monitor in Dobermans
- Consider in other breeds
- Pre-anesthesia? Consider based upon exam
- Monitor patients (all causes) with heart failure to help titrate medicines

Would Troponin Be Better?

- Troponin measures myocardial injury (MI in people)
 - Troponin use in dogs is MUCH more associated with severe ectopy or critical illness.
- It not interchangeable with NT-proBNP

Bottom Line

- **Echocardiography remains the gold standard, but NT-proBNP can help US a lot!**
- **Wellness exam, Pre-anesthesia, and respiratory signs in Primary care ALL benefit from NT-proBNP**
- **Point of Care testing you can have an answer immediately during visit, and subsequently improve patient care, client advice and decrease risk of anesthesia (Bionote Vcheck)**

For more information about Bionote's NT-proBNP, visit bionote.com

This program is approved for 1 hour of continuing education credit in jurisdictions that recognize RACE approval.