IDEXX LABORATORIES

DIAGNOSTIC UPDATE

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IDEXX SNAP® Feline proBNP Test—Now Use NTproBNP at Point of Care to Assess Stretch and Stress on the Heart

Feline heart disease is more common than many practitioners realize, and identifying cats with this elusive disease can be challenging. Building on the success of the Cardiopet® proBNP Test from IDEXX Reference Laboratories, the SNAP® Feline proBNP Test provides, in time-sensitive situations, a quick and affordable way to help you identify cats at increased risk of heart disease.

What is BNP and NTproBNP?

B-type or brain natriuretic peptide (BNP) is a neuroendocrine hormone that is produced as a prohormone (proBNP) in atrial myocytes. Normal, physiologic stretch of the atria causes the proBNP peptide to be cleaved and released as two smaller peptides; an inactive N-terminal peptide (NTproBNP) and a biologically active C-terminal peptide (C-BNP). With the development of cardiac disease, the hormone is also produced and released by ventricular myocytes in an amount that is proportional to the severity of the disease. The physiologic properties of C-BNP are to counteract the stretch that triggered its release from the myocardium. The hormone acts on receptors in blood vessels and the kidney to induce vasodilation and diuresis. Both the Cardiopet proBNP Test and the SNAP Feline proBNP Test measure the concentration of NTproBNP in circulation, which is a surrogate marker for increases in atrial and ventricular size as well as wall stress.[1] In general, the NTproBNP is released in proportion to the degree of stretch and stress on the myocardium, and concentrations increase with increasing severity of cardiac disease.

Heart Disease in Cats

Cardiomyopathies are the most common cardiac diseases in cats, and hypertrophic cardiomyopathy (HCM) is the most commonly diagnosed form of the disease. HCM is typically recognized in young to middle-aged male cats, but any cat can be affected. Certain breeds of cats, such as the Bengal, Himalayan, Persian and Maine coon, are at increased risk of the disease. HCM is characterized by concentric hypertrophy of the left ventricle and associated diastolic dysfunction (impaired ventricular relaxation). As the disease progresses, enlargement of the left atrium (LA) leads to an increased LA pressure and risk of developing congestive heart failure. Cats with an enlarged LA are also at increased risk of developing thromboembolic disease (saddle thrombus).

Diagnosing Heart Disease in Healthy Cats

Cats with cardiomyopathies can appear healthy even though they may have moderate to severe structural and functional heart disease as assessed by echocardiography.[2] When diagnosing heart disease, all cats should have a thorough history and physical examination. On auscultation, a systolic heart murmur at the sternal or parasternal border may be present with or without a gallop sound or arrhythmia. Keep in mind that not all cats with cardiomyopathy will have a murmur and innocent murmurs in healthy, older aged cats can be quite common. Auscultation cannot distinguish between an innocent murmur and one caused by heart disease. The only way to correctly identify and diagnose an underlying cardiomyopathy in an apparently healthy cat is with an echocardiogram.

Interpreting SNAP® Feline proBNP Results

The SNAP Feline proBNP Test uses the same biological reagents as the Cardiopet proBNP Test but provides results in 10 minutes. The result is displayed as a colored sample spot that is compared to a reference spot. If the color intensity of the sample spot is lighter than the color intensity of the reference spot, then the NTproBNP concentration is normal. If the color intensity of the sample spot is equal to or darker than the reference spot, then the NTproBNP concentration is abnormal (figure 1).

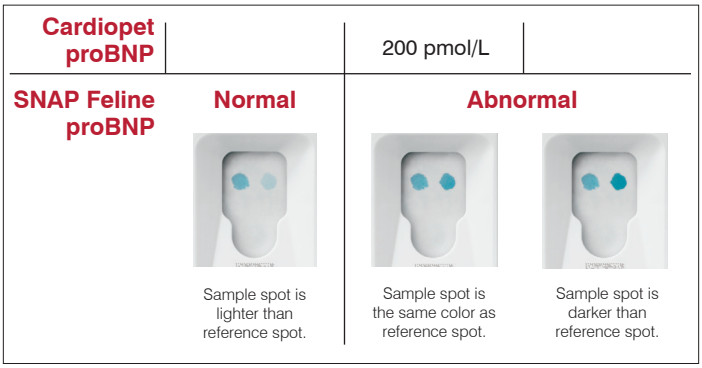


Figure 1. Examples of SNAP Feline proBNP Test interpretation and correlation with the Cardiopet proBNP Test.

Validation Study: In-clinic Performance of the SNAP Feline proBNP Test

Study design: Twenty feline samples were collected and tested using the SNAP® Feline proBNP Test at five veterinary practices. Each sample was tested once on two independent lots of the SNAP Feline proBNP Test. Samples were then submitted for Cardiopet® proBNP testing.

Results: Of the 100 feline samples, 57 had normal feline proBNP concentrations, as defined by the Cardiopet proBNP Test results (<100 pmol/L), and there was 100% agreement with the SNAP Feline proBNP Test. There were 43 samples with increased NTproBNP concentrations, as defined by the Cardiopet proBNP Test results (>100 pmol/L). All 23 samples with NTproBNP concentrations greater than 270 pmol/L tested abnormal on the SNAP Feline proBNP Test on both lots of devices. On average, one-third of the remaining 20 samples, which fell between 100 and 270 pmol/L on the Cardiopet proBNP Test, were identified as abnormal on the SNAP Feline proBNP Test (figure 2).

SNAP Feline proBNP Result	Cardiopet proBNP Result		
	<100 pmol/L	100–270 pmol/L	>270 pmol/L
Normal	57	13	0
Abnormal	0	7	23

Figure 2. Results of the validation study. Data represents two independent lots of the SNAP Feline proBNP Test.

How Can SNAP Feline proBNP Test Help?

The SNAP Feline proBNP Test is a diagnostic tool for assessing the presence of increased stretch and stress on the myocardium and provides another objective measure for evaluating heart health.

The SNAP Feline proBNP Test can be used to help encourage compliance with an echocardiogram on those asymptomatic cats at greatest risk of underlying cardiac disease

Innocent murmurs are common in cats. One out of four apparently healthy cats may have a murmur, but only 25% of these cats will have evidence of cardiomyopathy on an echocardiogram.[3–5] The SNAP Feline proBNP Test can be used to help identify those asymptomatic cats with cardiac risk factors (murmur, arrhythmia, gallop, breed) that are at greatest risk of cardiac disease. An abnormal result on the SNAP Feline proBNP Test indicates that there is increased stretch and stress on the myocardium and that cardiac disease is likely. Echocardiography is recommended for diagnosis and staging. If echocardiography is declined, thoracic radiographs with a vertebral heart score (VHS) should be considered. In a recent study, the SNAP Feline proBNP Test was found to be 85% sensitive and 85% specific for the detection of moderate to severe disease in asymptomatic, cardiac-risk cats.[6] Because cardiac disease can develop at any time, a single normal SNAP Feline proBNP Test may not reflect disease status in the future (figure 3a).

The SNAP Feline proBNP Test can be included in adult and senior cat profiles to help rule out moderate to severe cardiac disease

Approximately 15% of cats in the U.S. have heart disease, but only about 30% will present with a heart murmur.[3] By including the SNAP Feline proBNP Test as part of your adult and senior cat profiles, a normal result can help you to rule out moderate to severe cardiac disease in these patients (negative predictive value of 94.5%[6]). An abnormal result, however, indicates increased stretch and stress on the myocardium and the need for additional diagnostics. NTproBNP concentrations should be evaluated in the context of a total T_4, blood pressure and renal parameters. Concurrent disease, such as systemic hypertension, hyperthyroidism or severe azotemia, could result in increased NTproBNP concentrations. These increases are secondary to the effects that these conditions have on the cardiovascular system or the clearance mechanisms for NTproBNP (figure 3b).

Follow up the SNAP test with the feline Cardiopet proBNP Test to obtain the concentration of NTproBNP

In cases where other diagnostics may be inconclusive, an NTproBNP concentration may provide an indication as to the likelihood of cardiac disease. A quantitative NTproBNP concentration can also be used to monitor a patient at increased risk of cardiac disease. IDEXX VetConnect® PLUS now provides a graphical tool for trending NTproBNP concentrations similar to the trending available for other chemistry tests. A marked increase in NTproBNP concentration would be another indication for recommending additional diagnostics.

Contacting IDEXX

Expert feedback when you need it

If you have any questions on when to use the SNAP Feline proBNP Test or how to interpret test results, or if you would like treatment advice, please call for a consultation at 1-888-433-9987, option 4.

IDEXX Telemedicine Consultants provides consultation and interpretation services for radiographic, ECG and/or echocardiographic images. For more information, call 1-800-726-1212.

Recommended Reading

Gordon SG, Estrada AH. *The ABCDs of Small Animal Cardiology: A Practical Manual.* Guelph, ON: LifeLearn; 2013.

Oyama MA, Boswood A, Connolly DJ, et al. Clinical usefulness of an assay for measurement of circulating N-terminal pro-B-type natriuretic peptide concentration in dogs and cats with heart disease. *JAVMA.* 2013;243(1):71–82.

Figure 3a. Identify Heart Disease in Asymptomatic Cats

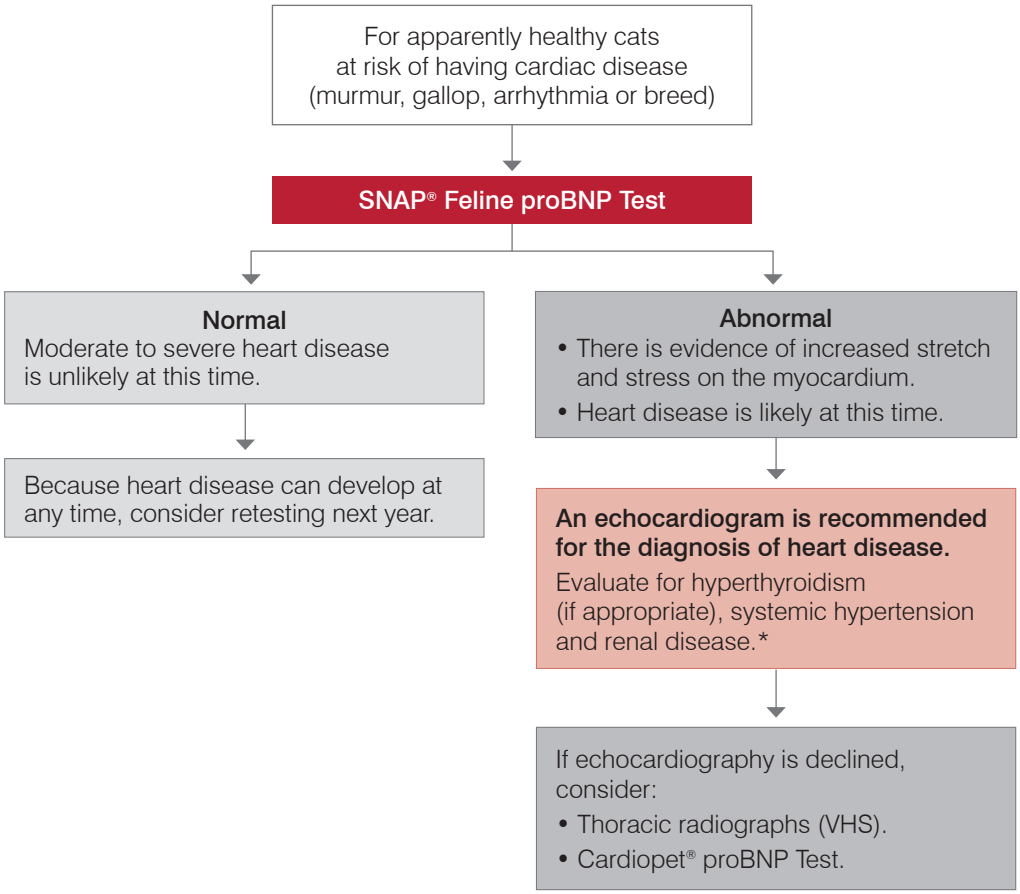
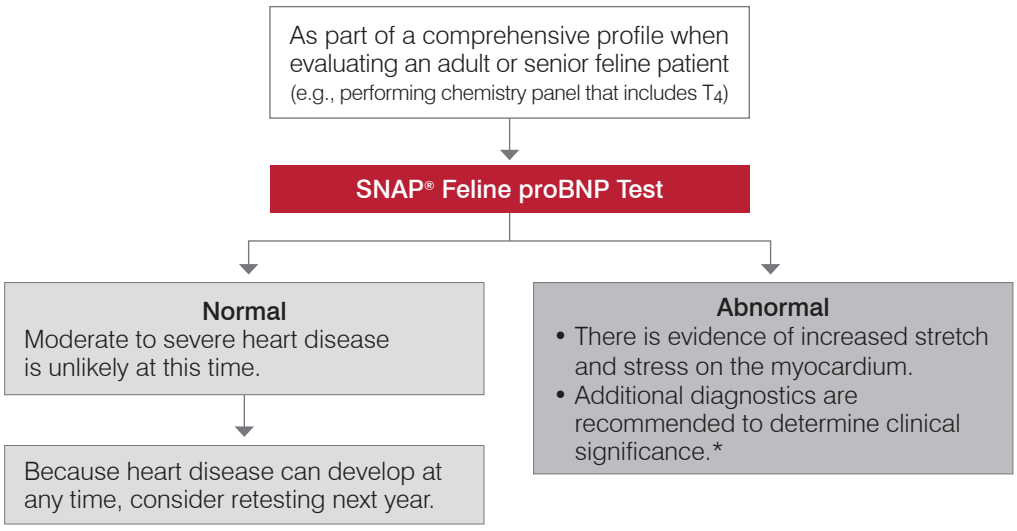


Figure 3b. Rule Out Moderate to Severe Cardiac Disease in Adult and Senior Cats



*Increased NTproBNP concentrations in cats may be secondary to the effects of hyperthyroidism or hypertension on the heart or as a result of reduced renal excretion in cats with severe azotemia.

Echocardiography is recommended for the diagnosis and management of heart disease in the cat. It generally provides the most accurate information regarding cardiac structure and function.

Thoracic radiographics, ECG and measurement of systolic blood pressure may also be considered.

References

1. Oyama MA, Boswood A, Connolly DJ, et al. Clinical usefulness of an assay for measurement of circulating N-terminal pro-B-type natriuretic peptide concentration in dogs and cats with heart disease. *JAVMA*. 2013;243(1):71–82.
2. Fox PR, Rush JE, Reynolds CA, et al. Multicenter evaluation of plasma N-terminal probrain natriuretic peptide (NT-pro BNP) as a biochemical screening test for asymptomatic (occult) cardiomyopathy in cats. *J Vet Intern Med.* 2011;25(5):1010–1016.
3. Paige CF, Abbott JA, Elvinger F, Pyle RL. Prevalence of cardiomyopathy in apparently healthy cats. *JAVMA*. 2009;234(11):1398–1403.
4. Côté E, Manning AM, Emerson D, Laste NJ, Malakoff RL, Harpster NK. Assessment of the prevalence of heart murmurs in overtly healthy cats. *JAVMA*. 2004;225(3):384–388.
5. Nakamura RK, Rishniw M, King MK, Sammarco CD. Prevalence of echocardiographic evidence of cardiac disease in apparently healthy cats with murmurs. *J Feline Med Surg.* 2011;13(4):266–271.
6. Machen MC, Gordon SG, Rush JE, et al. Multicentered Investigation of NT-proBNP Point-of-Care ELISA Assay to Detect Moderate to Severe Occult (Asymptomatic) Feline Heart Disease. Abstract presented at: 2013 ACVIM Forum; June 12–15, 2013; Seattle, WA.

The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment, you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical presentation and complete laboratory data. With respect to any drug therapy or monitoring program, you should refer to product inserts for a complete description of dosages, indications, interactions and cautions.

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