Evaluating Heart Health Just Got Easier with the New Feline Cardiopet® proBNP Test

Simplified specimen submission allows testing with routine blood work

Assessing and managing the heart health of your patients can be enhanced through the use of diagnostic tools. Information from these tools helps you make confident decisions and recommendations for patients at risk of heart disease or heart failure. The feline Cardiopet® proBNP Test provides you with additional information about your patients' heart health, and improvements to the test now make it even easier for you to add it to your current cardiac protocols: no special tube required and clearer recommendations provided with each result.

What Are 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 cause it to counteract the stretch which triggered its release from the myocardium. The hormone acts on receptors in blood vessels and the kidney to induce vasodilation and diuresis. The active C-BNP hormone is tightly regulated by a process of rapid intracellular degradation. While the half-life of C-BNP in the cat is not known, it is only about 90 seconds in the dog—making it particularly challenging to measure.¹ The NTproBNP peptide, as the inactive portion of the prohormone, has a much longer half-life relative to C-BNP making it more suitable for laboratory measurement.² The Cardiopet proBNP Test measures the concentration of NTproBNP in circulation, which is a surrogate marker for increases in atrial and ventricular size as well as wall stress.³ 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, like 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 Apparently 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.⁴ 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. Both thoracic radiographs and electrocardiograms (in the absence of an arrhythmia) have low sensitivity when screening apparently healthy cats for heart disease, as abnormalities may be absent in occult cardiac disease. Thoracic radiographs, however, are an important part of the minimum database for a patient with heart disease because cardiomegaly, early vascular or pulmonary changes could be detected. Measuring systemic blood pressure in a cat with a murmur is important for determining that the cat is normotensive, as hypertension, along with hyperthyroidism and anemia, can be underlying causes of a murmur. The only way to correctly identify and diagnose an underlying cardiomyopathy in an apparently healthy cat is with an echocardiogram.

How Can the Cardiopet proBNP Test Help?
The Cardiopet proBNP Test can be used to help encourage client compliance with an echocardiogram on those asymptomatic cats at greatest risk of underlying cardiac disease.

An apparently healthy cat with a murmur is at increased risk of having an underlying cardiomyopathy, and an echocardiogram should be recommended. Approximately 16%–44% of apparently healthy cats have a murmur, and 20%–30% of those will have evidence of cardiomyopathy by echocardiogram.⁵,⁶ The Cardiopet proBNP Test can be used to help encourage compliance with an echocardiogram on those asymptomatic cats at greatest risk of underlying cardiac disease. Concentrations of NTproBNP >100 pmol/L suggest that there is increased stretch and stress on the myocardium. The patient has an increased likelihood of cardiac disease.
and should undergo echocardiography for diagnosis and staging\(^4\) (see algorithm 1.) If echocardiography is declined, thoracic radiographs with a vertebral heart score (VHS) should be considered. Moderate to severe left atrial enlargement is usually evident on the dorsoventral view, while the VHS may help to identify mild to moderate increases in heart size. Because cardiac disease can develop at any time, a single normal NTproBNP concentration (<100 pmol/L) may not reflect disease status in the future.

The Cardiopet\textsuperscript{®} proBNP Test can also be used to help differentiate congestive heart failure from other respiratory diseases causing dyspnea.\(^9\)\(^,\)\(^10\)

In cats with respiratory signs, the results of the Cardiopet\textsuperscript{®} proBNP Test should be interpreted in combination with history, physical examination and thoracic radiographs and are particularly helpful when other diagnostic findings are inconclusive. A concentration of NTproBNP ≥270 pmol/L is supportive of congestive heart failure (CHF) with a sensitivity and specificity of 90% and 87%, respectively.\(^9\)\(^,\)\(^10\) In cats with respiratory signs, NTproBNP values <270 pmol/L suggest that clinical signs are not likely secondary to heart failure. Furthermore, values <100 pmol/L have very good negative predictive value for ruling out CHF in dyspneic cats (see algorithm 2.)

The Cardiopet proBNP Test can serve as an additional tool for identifying cats at risk of cardiomyopathy when included as part of a comprehensive profile for adult and senior patients.

Feline cardiomyopathy may be present in cats that may not have a murmur. In one study, the sensitivity of auscultation for detecting occult cardiomyopathy in cats was 31% relative to echocardiography.\(^7\) The Cardiopet proBNP Test can serve as an additional tool for identifying cats at risk of cardiomyopathy when included as part of a comprehensive profile for adult and senior patients. Concentrations of NTproBNP ≥100 pmol/L suggest that there is increased stretch and stress on the myocardium, and additional diagnostics are recommended to determine the clinical significance. Because cardiac disease can develop at any time, a single normal NTproBNP concentration may not reflect disease status in the future.

IDEXX VetConnect\textsuperscript{®} PLUS now provides a graphical tool for trending NTproBNP concentrations similar to other chemistry tests. A marked change in NTproBNP concentration would be another indication for recommending additional diagnostics.

**Other Reasons NTproBNP May Be Increased**

NTproBNP concentrations should be evaluated in the context of other diagnostic tests, including thyroid hormone concentration, 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.

**Ordering Information**

The Cardiopet proBNP Test is a quantitative first-line test that can be ordered as a stand-alone test or with your routine chemistry/CBC panel.

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<th>Code</th>
<th>Test Description</th>
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<tbody>
<tr>
<td>2666</td>
<td>Cardiopet\textsuperscript{®} proBNP Test—Feline</td>
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<tr>
<td>26661</td>
<td>Add-on Cardiopet\textsuperscript{®} proBNP Test—Feline</td>
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<td>2773</td>
<td>HealthChek\textsuperscript{™} Plus Profile with Cardiopet\textsuperscript{®} proBNP Test—Feline</td>
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<td>2774</td>
<td>Senior Screen with Cardiopet\textsuperscript{®} proBNP Test—Feline</td>
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<td>Chem 25, comprehensive CBC, feline Cardiopet\textsuperscript{®} proBNP Test, total T(_4), urinalysis</td>
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Cardiopet proBNP Test specimen requirements: 1 mL serum or 1 mL EDTA plasma (LTT; spin and separate plasma into a plain RTT or plastic tube). Submit specimens Monday–Friday.

Turnaround time: 1–2 working days

**Contacting IDEXX**

**Laboratory Customer Support**

If you have any questions regarding test codes, turnaround times or pricing, please contact our Laboratory Customer Support Team at 1-888-433-9987, option 3, option 5.

**Expert Feedback When You Need It**

If you have any questions on when to use the Cardiopet 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.

Cardiology telemedicine specialists are available for consultation on radiographs, ECG and/or echocardiographic images at 1-800-726-1212.
Algorithm 1. Identifying Heart Disease in Asymptomatic Cats

For apparently healthy cats suspected of having cardiac disease (murmur, gallop, arrhythmia or breed)

Cardiopet® proBNP Test

NTproBNP is <100 pmol/L

Normal
- No evidence of increased stretch and stress on the myocardium.
- Clinically significant heart disease is unlikely at this time.

NTproBNP is ≥100 pmol/L*

Abnormal
- There is evidence of increased stretch and stress on the myocardium.
- Clinically significant heart disease is likely at this time.

An echocardiogram is recommended for the diagnosis of heart disease.
Evaluate for hyperthyroidism (if appropriate), systemic hypertension and renal disease.

If echocardiography is declined, consider:
- Thoracic radiographs (VHS).
- Recheck using the Cardiopet proBNP Test in 6 months.

*NTproBNP may be increased in cats with severe azotemia.

Algorithm 2. Differentiating Heart Failure from other Diseases causing Respiratory Signs

Cat presenting with respiratory signs

Cardiopet® proBNP Test

NTproBNP is <270 pmol/L†

Respiratory signs are unlikely to be caused by heart failure.

NTproBNP is ≥270 pmol/L

Respiratory signs are likely caused by heart failure.

Thoracic radiographs and echocardiogram are recommended.
If declined, consider diuretic treatment trial.

*NTproBNP may be increased in cats with severe azotemia.

†Cats with NTproBNP ≥100 may require additional diagnostics to determine if concurrent heart disease is present.
Recommended Reading


References


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.