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# CLINICAL NOTES: Diagnosing Feline Heart Disease

## KEY POINTS

- Cats can have congenital or acquired heart disease
- Hypertrophic cardiomyopathy is the most common heart disease of cats
- Not all cats with asymptomatic heart disease will develop clinical signs
- N-terminal pro–B-type natriuretic peptide (NTproBNP) can be a useful tool in identifying cats at increased risk of having heart disease
- NTproBNP can help differentiate causes of dyspnea when used in conjunction with history, physical examination, and other appropriate diagnostic tests
- NTproBNP does not diagnose specific heart disease and cannot be used alone to determine if, when, and what kind of therapy is indicated

Feline heart disease can be either congenital or acquired. Congenital disease is usually diagnosed in very young patients, but acquired disease may be diagnosed in cats ranging from 3 months to 19 years of age. Acquired disease can be further categorized as either primary cardiomyopathy or secondary heart disease, which may result from such conditions as systemic hypertension, heartworm infection, and thyroid disease. Heart disease is fairly common in the cat, and an animal can have the disease for many years before exhibiting any clinical signs. In fact, not all cats with heart disease will develop clinical signs. In one study of 103 privately owned cats that appeared healthy, 16 of them had asymptomatic cardiomyopathy.[1]

Cats with cardiomyopathy can have the condition for years before the onset of clinical signs and many may never develop clinical signs. By detecting and staging asymptomatic cardiac disease earlier, the clinician can decide whether therapy should be initiated or if the cat should just be monitored.

## CHALLENGES IN DIAGNOSING FELINE HEART DISEASE

Although cardiomyopathy may be quite common in apparently healthy cats, diagnosis is not always easy.

### Auscultation and Heart Murmurs

The reported incidence of heart murmurs in apparently healthy cats is 21% to 50%.[1,3-6] Thus, careful thoracic auscultation should be part of every routine physical examination. However, cats with cardiomyopathy may not have a murmur and many cats that have murmurs have no evidence of heart disease based on an echocardiogram. In two studies, 80% to 95% of cats with murmurs had no evidence of disease and 2% to 15% of cats with no murmur had echocardiographic evidence of heart disease.[1,5] Currently, if a cat has a murmur, an echocardiogram is recommended and considered the gold standard. However, this study is frequently declined due to issues associated with convenience and/or cost.

### Thoracic Radiographs

Thoracic radiographs can reveal alterations in the cardiac silhouette, such as overall enlargement or chamber enlargement. However, these changes are neither sensitive nor specific for feline cardiomyopathy. Thoracic radiographs are the gold standard for diagnosing congestive heart failure and in this setting may demonstrate the presence of pulmonary edema or pleural effusion with or without venous congestion. However the lack of pathopneumonic findings of CHF is a limitation.

**Diagnostic Tests for Feline Heart Disease**

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| Auscultation | ■ Apparently healthy and dyspneic cats; screening test with a generally recognized very poor PPV and poor NPV |
| Thoracic Radiographs | ■ Apparently healthy cats; screening with a generally very poor NPV<br>■ Dyspneic cats; gold standard but still some limitations associated with the lack of pathopneumonic findings for CHF |
| Echocardiography | ■ Apparently healthy cats with heart murmurs, gallops, or arrhythmias; gold standard with high PPV and NPV<br>■ Dyspneic cats; will tell you if there is underlying heart disease of the type and severity that could lead to CHF but does not diagnose CHF |
| ECG | ■ Apparently healthy cats and dyspneic cats; very poor screening test for structural heart disease with very low NPV, PPV; may be better than some tests but not as good as others; test of choice for diagnosing arrhythmias |
| Cardiac biomarkers | ■ Apparently healthy and dyspneic cats<br>■ Products like NTproBNP can be used to support diagnosis of heart disease and heart failure |

PPV = positive predictive value NPV = negative predictive value CHF = congestive heart failure

## Echocardiography

Echocardiography can provide a definitive diagnosis as to the etiology of cardiac disease, by allowing assessment of cardiac structure—its dimensions and ventricular function. Echocardiography also enables the clinician to assess the direction, nature, and velocity of blood flow but is not the test of choice to diagnose CHF. Unfortunately, access to echocardiography is limited and may require referral, so it is often declined by clients.

## Cardiac Biomarkers

Cardiac biomarkers are substances (typically a gene product or hormone) elaborated by the heart that can be objectively evaluated and are an indicator of a pathologic process. B-type natriuretic protein (BNP) is a peptide hormone synthesized and released from the myocardium. N-terminal pro–B-natriuretic peptide (NTproBNP) is formed when the parent pro-hormone (proBNP) is cleaved into 2 molecules. NTproBNP is the more stable compound, whereas C-BNP is rapidly degraded. NTproBNP concentrations increase under conditions that lead to ventricular stretch and stress, such as heart disease and heart failure. Consequently, determinations of NTproBNP can be used to support the diagnosis of heart disease and heart failure.

### Current Potential Uses of NTproBNP in the Cat (Cardiopet™ proBNP)

- Screening test for possible/probable heart disease in cats
  - Cats with increased risk for cardiac disease
  - Apparently healthy cats
- Differentiation of dyspnea related to heart failure versus dyspnea from extra-cardiac causes
- Surveillance of progression of heart disease
- Staging severity of heart disease

### Potential limitations of NTproBNP in the Cat

- It does not diagnose a specific disease but rather identifies cats that have an increased risk of having heart disease or congestive heart failure
- It does not replace other diagnostic tests such as radiographs and echocardiography

### Summary

- It does not tell you when to begin therapy or what specific therapy to initiate
- As with other diagnostic tests, false-positives and false-negatives are possible
- It is cleared by the kidney and thus significant reductions in GFR could increase NTproBNP levels
- It is a sensitive protein and thus guidelines for sample submission must be adhered to

## SUMMARY

NTproBNP offers unique clinical information that can help identify cats that have a high risk of heart disease and congestive heart failure. When used in conjunction with other diagnostic tests, it may increase the accuracy and confidence of diagnosis of both heart disease and congestive heart failure by primary care veterinarians. It may also provide an alternative screening modality to assess cardiac risk in apparently healthy cats, particularly when echocardiography is recommended but declined.

## REFERENCES


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**NTproBNP offers unique clinical information that can help identify cats that have a high risk of heart disease and congestive heart failure**

IDEXX is inviting general practice veterinarians to participate in a field study designed to better understand feline heart disease. The results may give insight into the way in which NTproBNP is used in primary care practice and what the potential value is. IDEXX will continue the feline study through 2010 and anticipates the release of preliminary findings later this year. Veterinarians interested in participating should visit and enroll at idexx.com/knowcardio


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