

Feline Cardiomyopathy

Philip R. Fox DVM, Dipl. ACVIM/DECVIM (Cardiology), Dipl. ACVECC
The Animal Medical Center, New York, N.Y., U.S.A. 10065
Philip.fox@amcny.org Tel: 1 212 329 8606

This author will present new and emerging data from feline studies (funded by the Morris Animal Foundation and the WINN Feline Foundation) revealing that a substantial number of HCM cats will develop heart failure and/or aortic thromboembolism within five years of diagnosis.

Incidence of Heart Disease in the Cat

Heart muscle disease (cardiomyopathy) is the most common form of heart disease in the cat. Hypertrophic cardiomyopathy is the most prevalent of these conditions.

Cardiac Morbidity and Mortality

More than 95% of cardiac morbidity and mortality is caused by cardiomyopathy (myocardial disease). While the majority of affected cats appear to remain asymptomatic for life, the proportion that develops morbidity has not been identified. Diastolic heart failure is the most common cause of heart failure.

Many healthy, normal cats have systolic heart murmurs whose prevalence has been estimated to be between 10-30%. Echocardiography is the best method to assess cardiac structure and function, and determine whether the murmur is related to important underlying disease. One frequent cause of heart murmur is dynamic right ventricular outflow tract obstruction which, when present by itself, is not generally regarded to represent significant heart disease. Other causes of heart murmurs include mild mitral insufficiency, systemic and metabolic abnormalities such as anemia or hyperthyroidism, congenital heart disease, and the cardiomyopathies. Gallop rhythms are not normal and can be detected in 15% of cats with cardiomyopathy.

Heart Disease vs Heart Failure

Occult cardiomyopathy refers to myocardial disease without a history of failure. Heart failure is a syndrome and not a disease, so there is no single test that reliably identifies the failing heart. One therefore uses an integrated approach that evaluates clinical signs, physical examination findings, and results from various diagnostic test.

Diastolic Dysfunction

Diastolic dysfunction is the principal pathophysiologic consequence of a wide range of phenotypically heterogeneous myocardial disorders. Hearts from cats with ventricular hypertrophy (HCM), and restrictive cardiomyopathy (RCM) are affected by complex intrinsic and extrinsic factors that affect left ventricular diastolic performance. Some of the better recognized factors include altered loading conditions; increased myocardial mass (hypertrophy); myocardial injury (inflammation, myocytolysis, necrosis) and repair (fibrosis, matrix changes); myocyte disorganization; and ischemia. These alterations promote ventricular stiffness and loss of compliance (diastolic dysfunction). Diastolic heart failure may result.

Diastolic Heart Failure

When alterations in diastolic function lead to increased left ventricular filling pressure and mean left atrial pressure, congestive heart failure may result. *Diastolic heart failure* is said to be present when pulmonary edema occurs in the setting of abnormal diastolic function and relatively normal systolic function. It is the most common condition associated with acute CHF in the cat.

Test for Discriminating Cardiac vs Respiratory Cause of Dyspnea

Standard Tests: Thoracic radiography documents changes consistent with CHF (e.g., cardiomegaly and patchy, diffuse or focal pulmonary interstitial and alveolar infiltrates), detect effusions, masses, and other non-cardiac conditions. Echocardiography is the gold standard for assessing cardiac structure and function and characterizing the form of underlying myocardial disease. The ECG is valuable to characterize arrhythmias, but is insensitive for detecting heart disease. Noninvasive blood pressure measurement identifies systemic hypertension which can increase left ventricular wall thickness, especially with chronic renal failure and hyperthyroidism. Serum T4 (in cats older than six years of age) and PCV are important. High sensitivity and specificity using a commercial blood test to measure the cardiac biomarker, NT-proBNP has made this useful an adjunct test to help differentiate cardiac vs non-cardiac causes of respiratory distress. Moreover, assessment of NT-proBNP concentration in combination with conventional evaluation such as radiography and electrocardiography has been reported to significantly improve the accuracy and confidence of general practitioners to distinguish cats with primary respiratory disease from those with CHF. Diagnostic accuracy is improved when NT-proBNP assay is used in conjunction with other tests such as physical examination, ECG, radiography, and echocardiography.

The Role of Genetics and Feline Heart Disease

Feline hypertrophic cardiomyopathy is inherited in a number of breeds, including the Maine Coon, Sphynx, Ragdoll, Siberian and Norwegian Forest Cat breeds, and is suspected in the Persian, American short hair, and others. Genetic testing is relatively simple and can utilize DNA obtained from an oral swab to test for mutations found predominantly in the Main Coon cat and Ragdoll. The absence of a detectible mutation does not mean that the cat will never develop HCM. Importantly, it signifies that it does not have the only known mutation known to cause the disease in the cat at the present time. It is highly likely that additional mutations may be identified in the future.

Goals for Managing Heart Disease

The principle goal is to reduce cardiac morbidity and mortality. Presently, there remain important gaps in our understanding of key genetic and pathophysiologic aspects of these disorders. In absence of prospective, randomized clinical trials in cats, treatment strategies have been extrapolated from human data, retrospective feline case studies, pharmacologic or physiologic studies of drug mechanisms in cats, and personal experience.