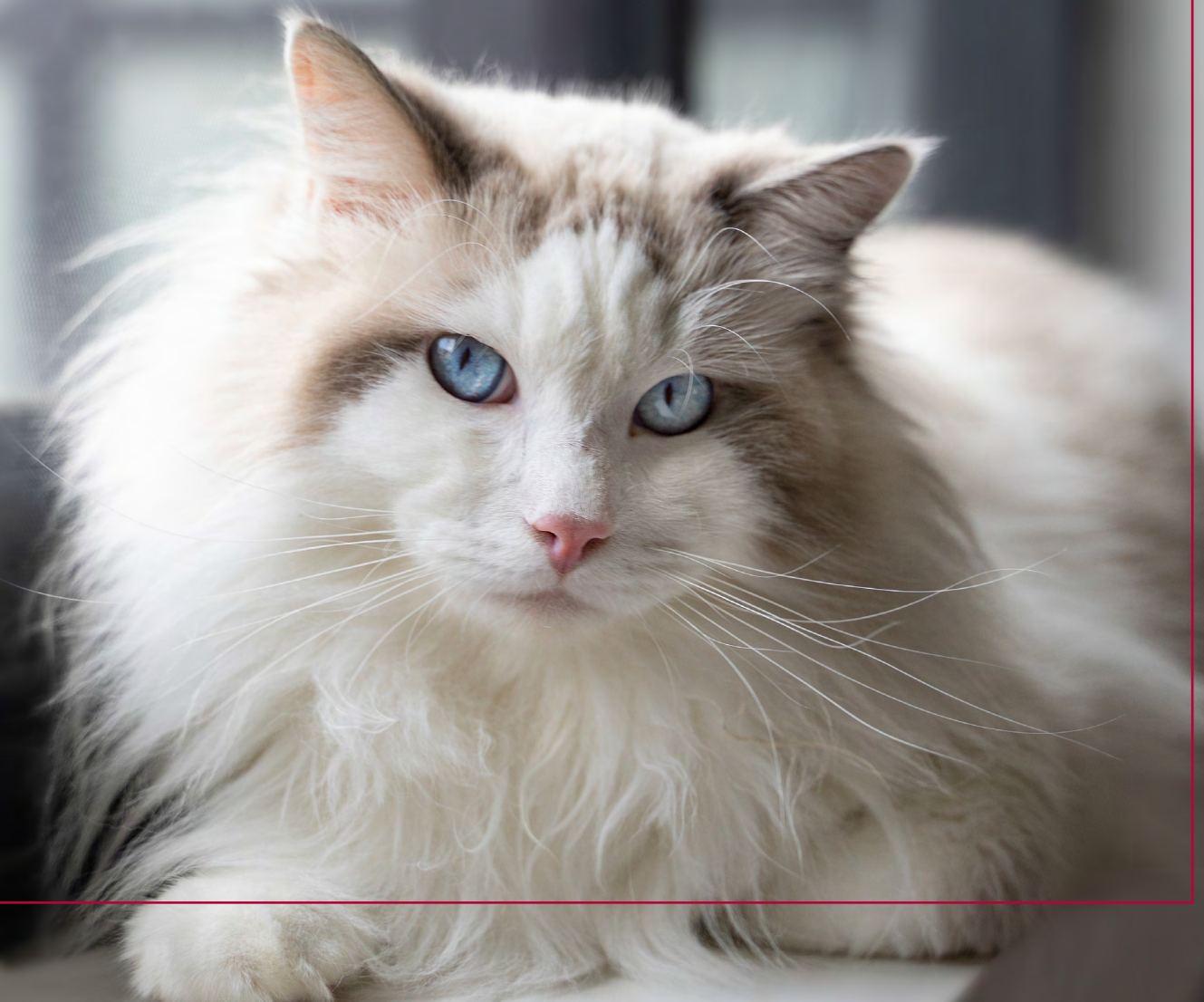


ABCDs of FELINE CARDIOMYOPATHY

Feline Cardiac Diagnostic Scheme



STAGE

A

Cats that are predisposed to cardiomyopathy but currently have no clinical evidence of myocardial disease

CEG Recommendations

Red background: High-priority CEG recommendations

Gray background: Lower-priority CEG recommendations



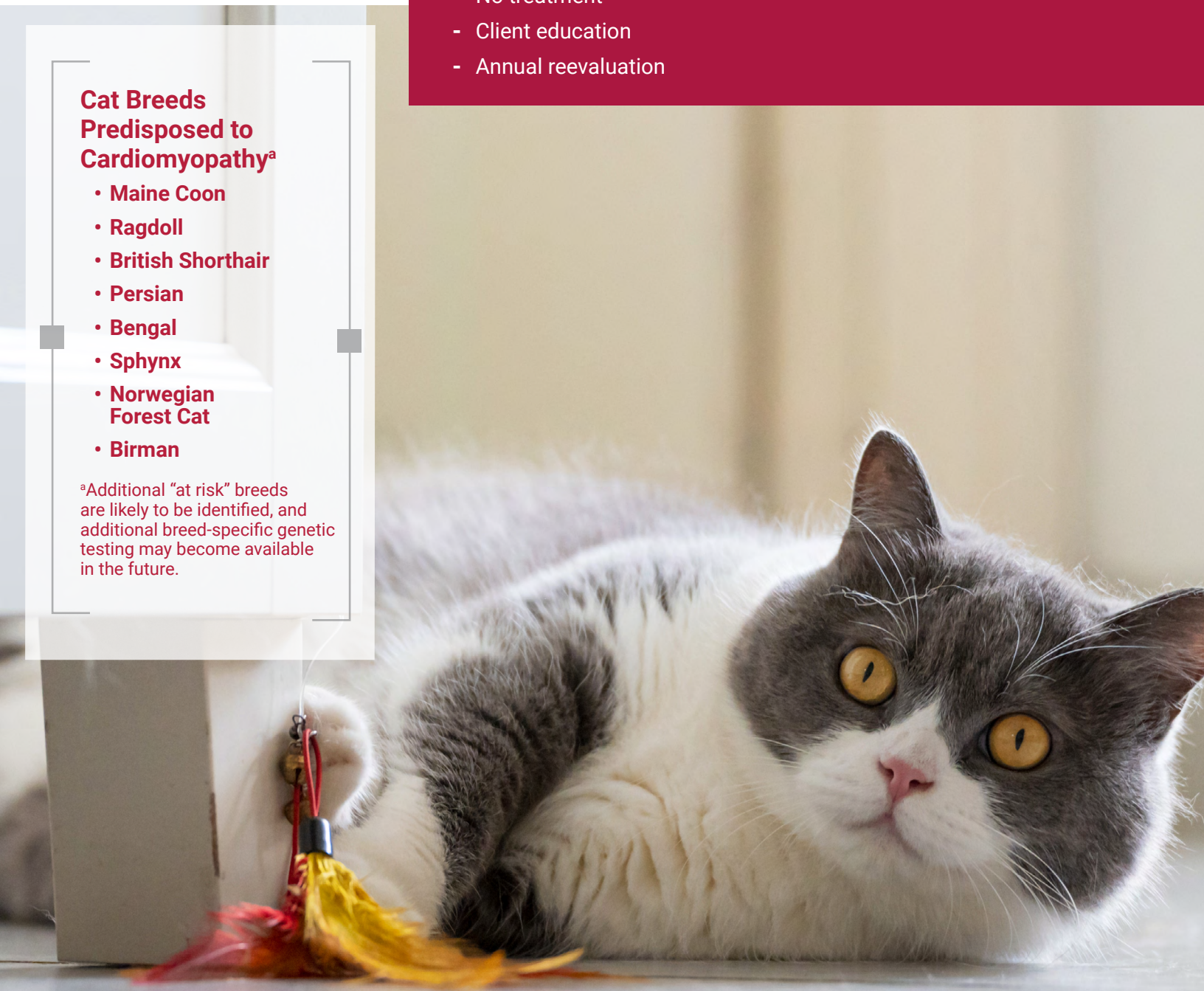
Where this icon appears, mouse over it to see additional information.

Cat Breeds Predisposed to Cardiomyopathy^a

- Maine Coon
- Ragdoll
- British Shorthair
- Persian
- Bengal
- Sphynx
- Norwegian Forest Cat
- Birman

^aAdditional “at risk” breeds are likely to be identified, and additional breed-specific genetic testing may become available in the future.

- Patient history
- Yearly auscultation
 - The absence of a heart murmur does not rule out preclinical cardiomyopathy
- Screening echocardiography for predisposed breeds
- Genetic tests are available for Maine Coon and Ragdoll breeds
- Elevated NT-proBNP concentrations may identify cats that may benefit from further diagnostic evaluation (see [NT-proBNP Testing in Cats](#))
- No treatment
- Client education
- Annual reevaluation



Cats with suspected or known cardiomyopathy that do not have clinical signs

STAGE

B

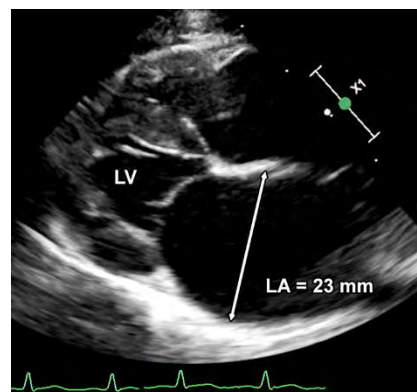
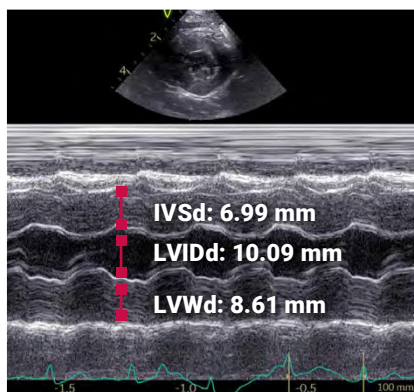
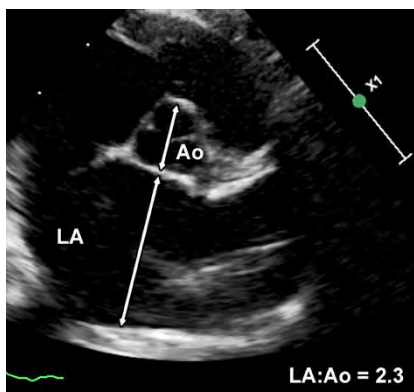
Defining Stages B1 and B2

Cardiomyopathy may be suspected when a murmur, gallop, or arrhythmia is detected on physical examination. Stage B cats are divided into Stage B1 or B2 based on risk of imminent CHF or ATE.

- **Stage B1:** Low risk of imminent CHF or ATE based primarily on minimal left atrial (LA) enlargement
- **Stage B2:** Increased risk of imminent CHF or ATE based on more severe LA enlargement (e.g., LA diameter ≥ 20 mm on long axis, LA:Ao ≥ 1.8) or presence of other risk factors

CEG Recommendations: Stages B1 and B2

- Patient history
- Cardiac and pulmonary auscultation
- Echocardiography
- Blood pressure
- Resting serum thyroxine concentration (cats ≥ 6 years of age)
- NT-proBNP
- Thoracic radiographs
- ECG when cardiac arrhythmia is evident during clinical examination
- Clinical lab tests: serum biochemistries, PCV/TS (or CBC), and urinalysis (prior to initiating any therapy in Stage B2 patients)



STAGE

B

Cats with suspected cardiomyopathy that do not have clinical signs

Red background: High-priority CEG recommendations

CEG Recommendations: Stages B1 and B2

- No specific dietary changes or exercise restrictions at this stage
- Manage systemic hypertension if present
- Manage hyperthyroidism if present

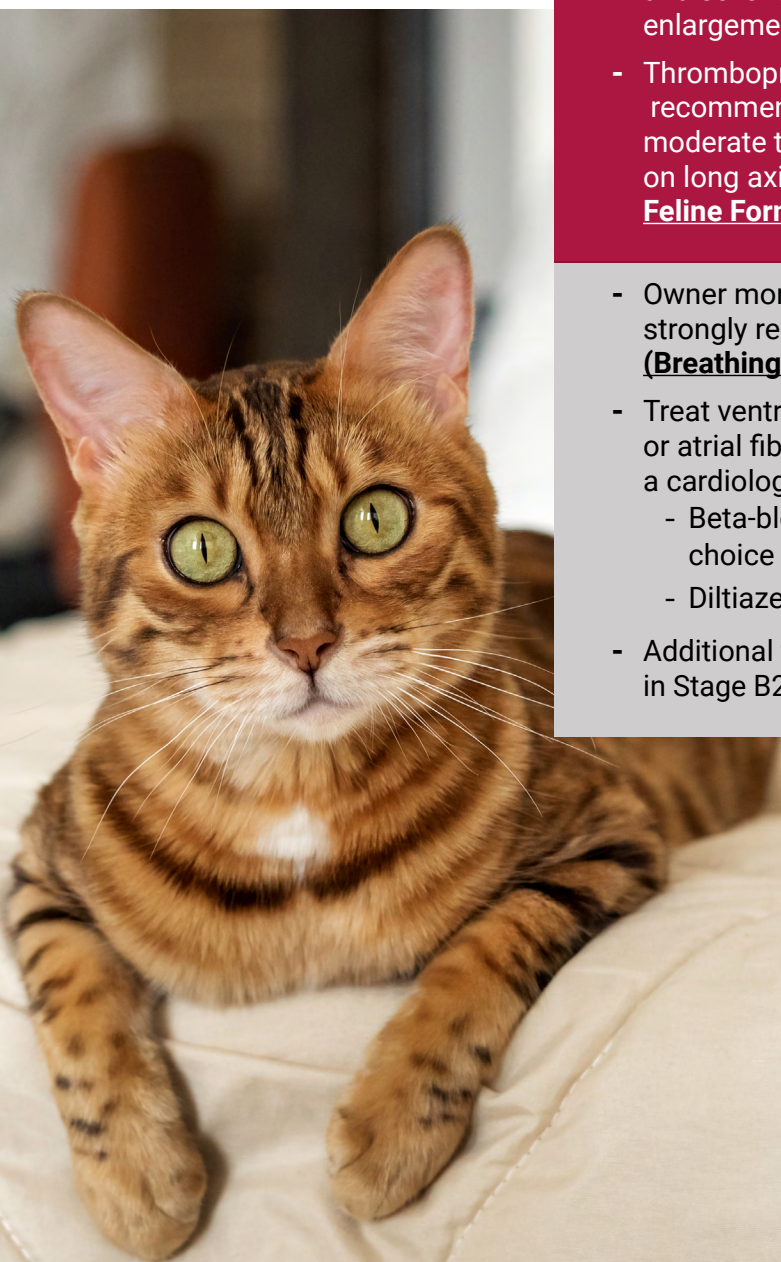
Gray background: Lower-priority CEG recommendations

CEG Recommendations: Stage B1 Only

- No treatment

CEG Recommendations: Stage B2 Only

- Echocardiographic identification of cardiomyopathic phenotype and severity of anatomic changes, including degree of LA enlargement, is recommended
- Thromboprophylactic therapy (e.g., clopidogrel, rivaroxaban) recommended when risk factors for ATE are present, primarily moderate to severe LA enlargement (e.g., LA diameter ≥ 20 mm on long axis, LA:Ao ≥ 1.8) or other identified risk factors (see [CEG Feline Formulary](#))
- Owner monitoring of resting or sleeping respiratory rate strongly recommended (see [Monitoring Your Pet's Respiratory \(Breathing\) Rate](#))
- Treat ventricular tachycardia or frequent ventricular ectopy or atrial fibrillation if indicated; consider consultation with a cardiologist
 - Beta-blocker therapy (e.g., atenolol, sotalol) most often first choice for therapy of ventricular ectopy
 - Diltiazem recommended for atrial fibrillation
- Additional therapies (e.g., ACEI, spironolactone) are controversial in Stage B2 disease. Consultation with a cardiologist may be helpful



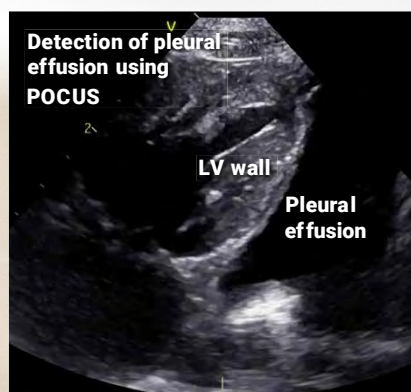
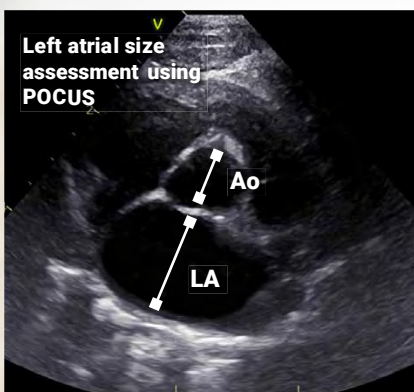
Cats with past or current clinical signs of CHF or ATE

Clinical Signs of Stage C Cardiomyopathy

- General signs of illness (e.g., hiding, inappetence)
- Signs of CHF (e.g., tachypnea, respiratory distress, hypothermia)
- Signs of arrhythmia (e.g., syncope) and/or signs of ATE (e.g., paresis, paralysis)

CEG Recommendations

- Patient history
- Cardiac and pulmonary auscultation
- Echocardiography for definitive diagnosis of underlying structural heart disease (may need to be delayed until the patient is clinically stable)
- Thoracic radiographs or POCUS to identify pulmonary edema, left atrial enlargement, or pleural effusion
- Cage-side SNAP® NT-proBNP testing might help discriminate respiratory disease causes of acute clinical signs versus CHF in cats with respiratory distress
- Blood pressure
- ECG when cardiac arrhythmia is evident during clinical examination
- Clinical laboratory tests:
 - Serum biochemistries, PCV/TS (or CBC), and urinalysis (prior to initiating any therapy and to monitor for renal and electrolyte abnormalities after therapy)
 - Thyroid testing if current thyroid status is not known (cats ≥ 6 years of age)



STAGE C

Cats with past or current clinical signs of CHF or ATE

CEG Recommendations

Standard treatment:

- Acute CHF: Oxygen supplementation, furosemide, anxiolysis, thoracocentesis if needed, supportive care
 - Chronic CHF: Furosemide, ACEI, thromboprophylaxis if indicated by echocardiographic findings
 - Most patients: Furosemide, clopidogrel
 - Renin-angiotensin-aldosterone system blockade recommended (ACEI and spironolactone) if tolerated
 - ATE: analgesia, anticoagulant therapy, supportive care (including CHF therapy if needed)
-
- Treat ventricular arrhythmias or atrial fibrillation as outlined for Stage B2
 - Owner assessment of cat's home sleeping respiratory rate recommended to monitor for recurrence of CHF (see **Monitoring Your Pet's Respiratory (Breathing) Rate**)

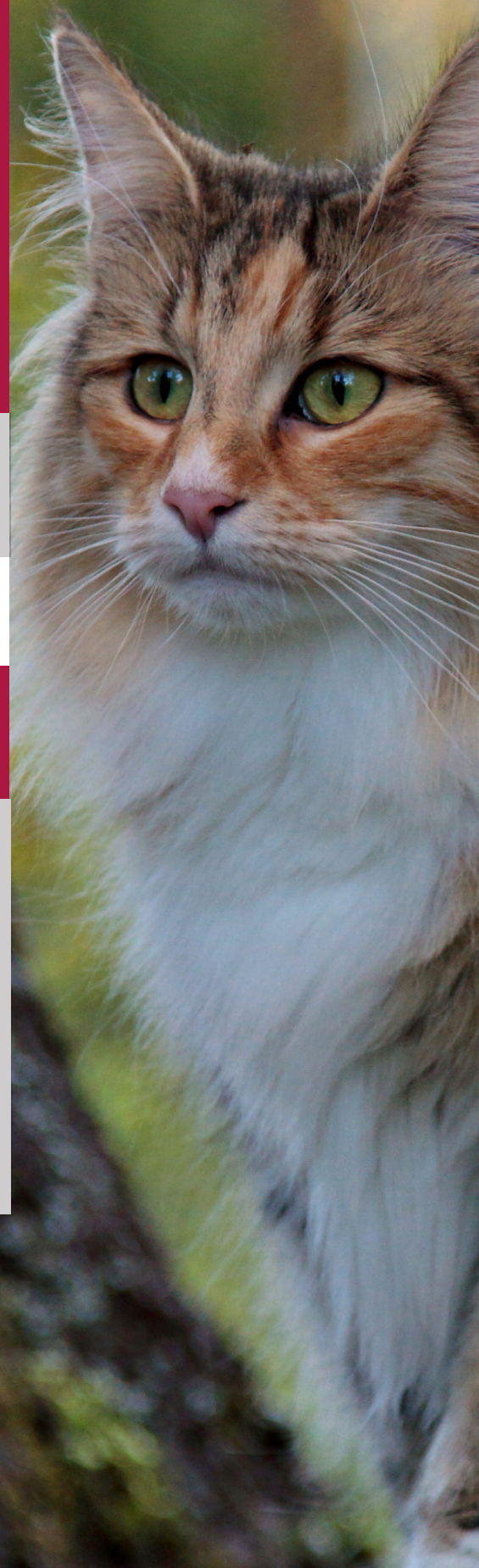


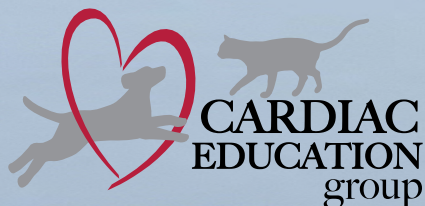
CEG Recommendations

- Patient history
 - Cardiac and pulmonary auscultation
 - Thoracic radiographs or thoracic POCUS to identify pleural effusion or pulmonary edema
 - Echocardiography for definitive diagnosis of underlying structural heart disease (may need to be delayed until patient is stabilized)
 - Blood pressure
 - Clinical laboratory tests: Serum biochemistries, PCV/TS (or CBC), and urinalysis (prior to initiating any therapy and to monitor for renal and electrolyte abnormalities after therapy). Thyroid status should be reassessed in Stage D patients
- NT-proBNP might help discriminate between cats with respiratory causes of clinical signs or CHF
 - ECG when cardiac arrhythmia is evident during clinical examination

CEG Recommendations

- Standard treatment: Furosemide, pimobendan, ACEI, and spironolactone
 - Thromboprophylaxis if indicated by echocardiographic findings
- Torsemide may be considered in place of furosemide if high doses of furosemide not effective for recurrent CHF
 - Atrial fibrillation—diltiazem therapy if indicated
 - Ventricular arrhythmias—sotalol therapy if indicated
 - Other therapies may be helpful; consultation with a cardiologist is strongly recommended
 - Dietary changes—avoid excessive sodium intake and maintain adequate protein and caloric intake. Dietary intake is prioritized over sodium restriction
 - Appetite stimulants may be useful





Endnotes

1. Other risk factors: presence of arrhythmia, extreme LV hypertrophy, spontaneous echo contrast/thrombus, regional wall motion abnormalities, LV systolic dysfunction.
2. Abnormal auscultation findings indicate that further evaluation is warranted but are not diagnostic for cardiomyopathy. Conversely, some cats with cardiomyopathy may have normal auscultation findings.
3. Echocardiographic findings allow diagnosis of specific type of cardiomyopathy, including hypertrophic cardiomyopathy (HCM), restrictive cardiomyopathy (RCM), dilated cardiomyopathy (DCM), or nonspecific cardiomyopathic phenotypes, as well as degree of severity of changes (see **ACVIM Consensus Statement**). Point-of-care exams may be used to document degree of LA enlargement and/or presence of spontaneous echo contrast or intracardiac thrombus in cats without clinical signs.
4. Abnormal SNAP® NT-proBNP or Cardiopet® NT-proBNP quantitative results (IDEXX® Laboratories, Inc.) are an indication for echocardiography (see **NT-proBNP Testing in Cats**).
5. Radiographic findings are not diagnostic for cardiomyopathy but may be used to track progressive cardiomegaly or document evidence of respiratory disease, and may be used as baseline information for Stage B2 cats.
6. Beta-blocker therapy (e.g., atenolol, sotalol) is most often the first choice for therapy of ventricular ectopy. Atenolol therapy for preclinical cats with dynamic LV outflow obstruction is controversial, and consultation with a cardiologist may be helpful.
7. Other risk factors for ATE include spontaneous echo contrast ("smoke"), visible intracardiac thrombus, LA decreased systolic function (LA fractional shortening $\leq 20\%$), or low LA appendage velocities.
8. Thoracic radiographs may be too stressful to be completed in severely dyspneic patients. Emergency thoracocentesis should be performed to stabilize patients with severe pleural effusion.
9. POCUS may be used to document cardiac disease as the cause of dyspnea by identifying LA enlargement in the presence of pleural effusion or pulmonary B-lines that may indicate pulmonary edema.
10. NT-proBNP assessment can be performed using a blood sample or a pleural effusion sample that has been diluted 1:1 with saline.
11. "Normal" SNAP® NT-proBNP results make CHF **unlikely** to be the cause of the patient's respiratory distress. A strong "Abnormal" result **supports** a diagnosis of CHF. A weak "Abnormal" result should be interpreted with caution.
12. If systolic dysfunction is present, pimobendan or dobutamine therapy may be helpful.
13. Injectable butorphanol (IM) recommended for anxiolysis. Supportive care includes access to water and access to gentle warming for hypothermic patients.
14. Although furosemide is almost always needed to control chronic CHF in cats, addition of other medications should be based on patient tolerance.
15. If clopidogrel is not tolerated, factor Xa inhibitors (apixaban, rivaroxaban) may be considered. Consultation with a cardiologist is recommended.
16. Potent opioid-based analgesics (such as fentanyl, hydromorphone, or methadone) are recommended for pain control. Concurrent use of butorphanol with these medications may reduce analgesic efficacy.
17. Immediate commencement of low-molecular-weight heparin or unfractionated heparin injections or oral dosing of factor Xa inhibitor (e.g., apixaban, rivaroxaban) is recommended (see **CEG Feline Formulary**).

Clinical Resources

[ACVIM Consensus Statement Guidelines for the Classification, Diagnosis, and Management of Cardiomyopathies in Cats](#)

[CEG Circulations: NT-proBNP Testing in Cats](#)

[CEG Client Handout: Monitoring Your Pet's Respiratory \(Breathing\) Rate](#)

[CEG Formulary: Cardiac Medications for Cats](#)

Abbreviations

ACEI, angiotensin-converting enzyme inhibitor; **ACVIM**, American College of Veterinary Internal Medicine; **ATE**, aortic thromboembolism; **CBC**, complete blood count; **CEG**, Cardiac Education Group; **CHF**, congestive heart failure; **ECG**, electrocardiogram; **IM**, intramuscular; **IVSd**, interventricular septal end diastole; **LA**, left atrium; **LA:Ao**, left atrial-to-aortic root ratio; **LV**, left ventricle; **LVIdd**, left ventricular internal diameter in diastole; **LVWd**, left ventricular wall thickness in diastole; **NT-proBNP**, N-terminal pro-B-type natriuretic peptide; **PCV/TS**, packed cell volume/total solids; **POCUS**, point-of-care ultrasound.