

## About the Cardiac Education Group (CEG)

The Cardiac Education Group is a group of board-certified veterinary cardiologists from both academia and private practice that offers independent recommendations for the evaluation and treatment of canine heart disease. The group is committed to providing resources and information on the diagnosis, treatment and management of heart disease and heart failure in dogs in order to promote early detection and diagnosis with greater accuracy and confidence.

## The CEG Mission

The CEG offers educational recommendations and resources that will help veterinarians diagnose, treat and manage heart disease and heart failure in dogs, improving the lives of dogs with heart disease.

## The CEG promotes and facilitates:

- Educational activities to increase veterinarians' skills and confidence in diagnosing, treating and managing heart disease and heart failure.
- Tools and resources to help veterinarians detect and diagnose heart disease earlier and with greater accuracy.
- Recommendations to ensure dogs with heart failure receive optimal care and treatments to promote longevity and quality of life.
- On-line resources for veterinarians.
- Collaboration among pet owners and veterinarians pertaining to canine heart health.



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## Initial Treatment of Life Threatening Congestive Heart Failure (CHF)

Initial treatment of acute CHF should include injectable furosemide, oxygen and butorphanol sedation if needed. Administer pimobendan if the patient can tolerate oral medication. These patients require 24-hour care and may benefit from specialty referral. Stabilize the patient before transport is considered.

## Complicating Airway Disease

The presence of some respiratory conditions may complicate classification of dogs with heart disease. This is especially problematic in distinguishing class B2 from class C dogs. Collapsing trachea, mainstem bronchial compression due to left atrial enlargement, chronic bronchitis or pulmonary hypertension may cause symptoms similar to those of congestive heart failure. These include coughing, tachypnea or symptoms related to airway obstruction. These patients may require additional diagnostic testing and/or therapeutic trials. See [www.CardiacEducationGroup.com](http://www.CardiacEducationGroup.com) for additional details.

### Whit Church, DVM, Diplomate ACVIM

Arizona Veterinary Specialists, Gilbert, AZ

### John D. Bonagura, DVM, MS, Diplomate ACVIM

Professor, Veterinary Clinical Sciences, Ohio State University

### Sonya Gordon, DVM, DVSc, Diplomate ACVIM

Associate Professor of Cardiology, Texas A&M University

### Michael Luethy, DVM, Diplomate ACVIM

Chicago Veterinary Emergency and Specialty Center, Chicago, IL

### Rebecca Stepien, DVM, MS, Diplomate ACVIM

Clinical Professor, School of Veterinary Medicine, University of Wisconsin-Madison





### Alan Spier, DVM, PhD, Diplomate ACVIM

Florida Veterinary Specialists, Tampa, FL



# CANINE CARDIAC DIAGNOSTIC SYSTEM ABCD's of Canine Cardiology



HEART FAILURE STAGES	DIAGNOSTICS	CEG PANEL RECOMMENDATIONS
<p><b>A</b> Dogs with no structural disease but high risk for developing heart disease</p>	<ul style="list-style-type: none"> <li>• <b>Yearly auscultation</b></li> <li>• <b>Screening programs for selected dogs</b></li> </ul>	<ul style="list-style-type: none"> <li>• No treatment</li> <li>• Client education</li> <li>• Annual re-evaluation</li> </ul>
<p><b>B</b> Dogs with structural heart disease that have not yet developed clinical signs of heart failure</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="198 350 498 564">  <p><b>B1:</b> No cardiac enlargement</p> </div> <div data-bbox="689 350 990 564">  <p><b>B2:</b> Cardiac enlargement is present</p> </div> </div>	<ul style="list-style-type: none"> <li>• <b>Patient history</b><sup>1</sup></li> <li>• <b>Cardiac and pulmonary auscultation</b></li> <li>• <b>Thoracic radiographs</b><sup>2,3</sup></li> <li>• Blood pressure</li> <li>• Serum biochemistries, PCV/ TS (or CBC) and urinalysis (prior to initiating any therapy)</li> <li>• ECG when cardiac arrhythmia is evident during clinical examination</li> <li>• NT-proBNP<sup>4</sup></li> <li>• Echocardiography for definitive diagnosis of underlying structural heart disease<sup>5</sup></li> <li>• 24 hours ambulatory (Holter) ECG for evaluation of heart rhythm disturbances<sup>5,6</sup></li> <li>• Ambulatory event monitor ECG for evaluation of syncope<sup>5,7</sup></li> </ul>	<ul style="list-style-type: none"> <li>• No specific dietary changes or exercise restrictions at this stage</li> <li>• Manage systemic hypertension if present</li> </ul> <p><b>B1:</b> MVD – No treatment DCM – Since optimal therapy is uncertain, consulting a cardiologist may be useful in these patients</p> <p><b>B2:</b> MVD – ACEi in patients with severe cardiac enlargement DCM – ACEi in patients with confirmed cases and consult a cardiologist regarding use of Beta blockers or other treatments<sup>8</sup></p>
<p><b>C</b> Dogs with past or current clinical signs of heart failure</p> <div data-bbox="198 707 498 938">  </div>	<ul style="list-style-type: none"> <li>• <b>Patient history</b><sup>1</sup></li> <li>• <b>Cardiac and pulmonary auscultation</b></li> <li>• <b>Thoracic radiographs</b><sup>2,3</sup></li> <li>• Blood pressure</li> <li>• Serum biochemistries, PCV/ TS (or CBC) and urinalysis (prior to initiating any therapy)</li> <li>• ECG when cardiac arrhythmia is evident during clinical examination</li> <li>• NT-proBNP<sup>4</sup></li> <li>• Echocardiography for definitive diagnosis of underlying structural heart disease<sup>5</sup></li> <li>• 24 hours ambulatory (Holter) ECG for evaluation of heart rhythm disturbances<sup>5,6</sup></li> <li>• Ambulatory event monitor ECG for evaluation of syncope<sup>5,7</sup></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Standard Treatment: Furosemide, Pimobendan, ACEi</b></li> <li>• Spironolactone is commonly added to long-term therapy</li> <li>• Atrial fibrillation<sup>8</sup> – digoxin and/or diltiazem</li> <li>• Ventricular arrhythmias<sup>8</sup> – lidocaine for emergency therapy of ventricular tachycardia</li> <li>• Consider dietary changes: avoid excessive sodium intake and maintain adequate protein intake</li> <li>• Exercise as tolerated, avoid prolonged strenuous activity</li> </ul>
<p><b>D</b> Dogs with end-stage disease with clinical signs of heart failure refractory to standard therapy</p> <div data-bbox="689 991 1020 1263">  </div>	<ul style="list-style-type: none"> <li>• <b>Patient history</b><sup>1</sup></li> <li>• <b>Cardiac and pulmonary auscultation</b></li> <li>• <b>Thoracic radiographs</b><sup>2,3</sup></li> <li>• Blood pressure</li> <li>• Serum biochemistries, PCV/ TS (or CBC) and urinalysis (prior to initiating any therapy)</li> <li>• ECG when cardiac arrhythmia is evident during clinical examination</li> <li>• NT-proBNP<sup>4</sup></li> <li>• Echocardiography for definitive diagnosis of underlying structural heart disease<sup>5</sup></li> <li>• 24 hours ambulatory (Holter) ECG for evaluation of heart rhythm disturbances<sup>5,6</sup></li> <li>• Ambulatory event monitor ECG for evaluation of syncope<sup>5,7</sup></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Standard Treatment: Furosemide, Pimobendan, ACEi &amp; Spironolactone</b></li> <li>• Digoxin if not contraindicated<sup>9</sup></li> <li>• Atrial fibrillation<sup>8</sup> – digoxin and/or diltiazem</li> <li>• Ventricular arrhythmias<sup>8</sup> – lidocaine for emergency therapy of ventricular tachycardia</li> <li>• Other therapies may be helpful but consultation with a cardiologist is strongly recommended</li> <li>• Dietary changes: avoid excessive sodium intake and maintain adequate protein and caloric intake</li> <li>• Exercise as tolerated, avoid prolonged strenuous activity</li> </ul>
<p><b>KEY:</b>      <b>Red text :</b> ESSENTIAL diagnostic procedures      <b>Black text :</b> Diagnostic procedures to consider</p>		

1. The history should include: Exercise tolerance, resting respiratory rate, appetite, interaction with family, evident clinical signs (cough, collapse), and overall assessment of quality of life.

2. A second opinion from a radiologist or cardiologist may be helpful.

3. See [www.CardiacEducationGroup.com](http://www.CardiacEducationGroup.com) for more information about radiographs and the Vertebral Heart Scale.

4. The role of this blood test is still evolving; obtained from a reference lab.

5. Often a referral examination.

6. A Holter ECG is used to identify and assess severity of arrhythmias; a Holter ECG may be sensitive for recognition of cardiomyopathy.

7. An event monitor ECG is useful for determining the cause of syncope.

8. Additional medications or consultation with a cardiologist may be useful in select cases.

9. Relative contraindications for digoxin include: Impaired renal function (digoxin is eliminated by the kidneys); complicated ventricular ectopy (digoxin may worsen PVCs); conduction disease of the sinus node or atrioventricular node (digoxin may suppress these tissues).