



## Mitral valve disease – Updated May 2021

Degenerative myxomatous mitral valve disease (DMVD) is a common cause of morbidity and mortality in the dog, and accounts for an estimated 75% of treated cardiac disease in North America.<sup>1</sup> Small breed dogs (<20kg) are most commonly and severely affected, though the majority of dog breeds may show signs of DMVD with advanced age. Histopathologic features of the disease include thickening and deformation of the mitral valve leaflets.<sup>2</sup> These changes are in part due to increased accumulation of glucosaminoglycans and proteoglycans, breakdown of elastin, and disorganization of the collagen network within the valve leaflets.<sup>3,4</sup> In the natural progression of the disease, the entire valve apparatus is weakened.<sup>2</sup>

The mechanisms of DMVD are poorly understood, and disease progression is likely dependent on a combination of genetic mutations, age, breed, strain on the valve leaflets, and dysfunction in multiple cellular pathways. Recent studies have implicated several of these molecular pathways in the progression of DMVD.<sup>3, 5-9</sup> Furthermore, genetic mapping studies of DMVD have been previously performed in King Charles Cavalier Spaniels,<sup>10,11</sup> however, definitive genetic mutations were not found, likely due to low sample number,<sup>10</sup> or because fine mapping studies were not performed.<sup>11</sup>

Clinically, this disease is characterized by the thickening and deformation of the mitral and tricuspid valves. Abnormal coaptation of the valves leads to backwards flow of blood during contraction of the heart. Generally, the mitral valve leaflets (left side of the heart) are more severely affected than the tricuspid valve leaflets (right side of the heart). This disease is classified into in 5 stages, according to the ACVIM consensus statement<sup>12</sup>:

**Stage A:** Patient has no evidence of disease but is considered an “at risk” breed.

**Stage B1:** No clinical signs. Heart murmur may be ausculted. Echocardiogram reveals mitral regurgitation but no remodeling of the heart.

**Stage B2:** No clinical signs, though intermittent cough may be noted. Heart murmur ausculted. Echocardiogram reveals mitral regurgitation with left atrial enlargement. *Pimobendan (Vetmedin) therapy should be initiated at this stage, as it is clinically proven to prolong the time to congestive heart failure.*<sup>13</sup>

**Stage C:** Clinical signs are present at this stage. Heart murmur ausculted, +/- crackles in the lung fields. Echocardiogram reveals mitral regurgitation with left atrial enlargement. Pulmonary edema is noted on chest radiographs. *Medications to control congestive heart failure initiated at this stage.*

**Stage D:** Congestive heart failure that is refractory to medical therapy.

### **Important practical considerations:**

**1. Most patients will progress through the stages of disease throughout the course of their lives.** However, rate of disease progression is highly variable. Some dogs may never develop Stage C disease (congestive heart failure), while others will progress to refractory disease (Stage D) more rapidly.

**2. Importantly**, while mitral valve disease is not curable, it is a very treatable disease. This disease is not painful, and most patients have a very good quality of life. Average survival times after congestive heart failure is diagnosed (Stage C) is approximately 18 months.

**3. It is normal that medications will need to be adjusted regularly in Stage C disease, as the disease progresses, and the patient becomes resistant to furosemide.** Therefore, close monitoring by the owner for clinical signs, such as increasing respiratory rate, coughing, and collapse is imperative. Close communication between the owner and cardiologist is imperative to ensure that the patient is receiving appropriate treatment.

## References

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