Cardiac Troponin-I as a Biomarker

Cardiac troponins are involved in regulation of calcium-mediated action in cardiac muscle cells. Troponins, released into circulation with myocardial injury, are used in humans to quantify injury degree, monitor disease progression, and provide prognostic information. In dogs with myxomatous mitral valve disease (MMVD), cardiactroponin-I (cTnI) concentration increases with disease severity. In dogs with advanced MMVD but with no or mild clinical signs of CHF, plasma concentrations of aldosterone and renin activity have been reported to be increased in one study and decreased in another.

This study evaluated whether histopathologic changes might be reflected by in vivo cTnI and aldosterone concentrations and renin activity in dogs with naturally occurring congestive heart failure (CHF) from MMVD. Fifty owned dogs with CHF secondary to MMVD were examined echocardiographically twice yearly until death, and blood samples were stored. Each underwent standard necropsy. cTnI was associated with left ventricular end-diastolic dimension and proximal isovolumetric surface area radius. In-vivo cTnI concentrations were also correlated with global myocardial fibrosis, papillary muscle fibrosis, and degree of arterial luminal narrowing, supporting the theory of the role of arteriosclerosis in progression of CHF in MMVD through myocardial damage. There were no associations found with aldosterone or renin activity, although this may have been affected by varying treatment protocols. These results could indicate a novel use for cTnI as a predictor for fibrosis in chronic cardiac disease; further investigation is warranted.

Commentary

Biomarkers for diagnosing and staging heart disease have become a research focus in both veterinary and human medicine. Dogs in this study were on varied medical therapy, many aimed to blunt the renin-angiotensin-aldosterone system (RAAS), and no correlation of degree of fibrosis to renin or aldosterone levels could be discerned. This is pertinent as one of the arguments for ACE inhibitors, spironolactone, or angiotensin receptor antagonists is based on the hypothesis that increased activity of RAAS in patients with heart failure increases the degree of myocardial fibrosis long term. There was no attempt to correlate the levels of renin and aldosterone to drug dosages, and thus this question remains unanswered. CTnI, however, was found to correlate to degree of fibrosis, with higher elevations of cTnI reflective of greater degrees of histologic replacement fibrosis. Thus, circulating cTnI levels may help determine disease severity or potentially long-term prognosis. While this may be important for CHF therapeutic development and understanding the pathogenic mechanisms, cTnl is not readily applicable yet as levels were still only mildly elevated in most cases. Practitioners should continue to read about cardiac biomarkers and their utility such that they know when they are appropriate diagnostic tools.—*Amara Estrada, DVM, DACVIM (Cardiology)*

Source

Cardiac troponin-I concentration, myocardial arteriosclerosis, and fibrosis in dogs with congestive heart failure because of myxomatous mitral valve disease. Falk T, Ljungvall I, Zois NE, et al. *JVIM* 27:500-506, 2013.

Research Note: Heritability of Cherry Eye in Dogs

Prolapsed nictitating membrane gland (PNMG), or *cherry eye*, is common in young dogs. The exact cause is unknown, but PNMG may arise from weakness in the connective tissue attachments of the nictitating membrane and/or exposure to environmental allergens causing hyperplasia of the lymph gland. Increased prevalence in certain breeds suggests a possible hereditary link. This study investigated the inheritance of PNMG in 2 related lines of purpose-bred crossbreed dogs with an unusually high prevalence of PNMG. In the first line of dogs (GS), 8/201 (4%) were diagnosed with PNMG; the second line (M) had 5/50 dogs (10%) diagnosed with PNMG. All research dogs possessed a dolichocephalic phenotype. The high prevalence of PNMG suggested genetic factors were involved. Simple Mendelian inheritance was quickly ruled out on detailed pedigree analysis. Future studies using selective breeding of affected dogs or gene expression studies relating to weakened connective tissue bands in the nictitating membrane may be warranted.

Source

Investigating the inheritance of prolapsed nictitating membrane glands in a large canine pedigree. Edelmann ML, Miyadera K, Iwabe S, Komáromy AM. *VET OPHTHALMOL* 16:416-422, 2013.

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