ProBNP

When To Use It And What It Tells You

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Biomarkers

• Substance measured in blood that indicates biological/pathologic process
• May be used to monitor treatment response
• Ideal biomarker not influenced by other disease

Cardiac Biomarkers In Veterinary Medicine

• Troponin I – cTnI
• B-type Natriuretic Peptide – BNP

• Both affected by renal disease
  • Interpret in relation to creatinine/SDMA
• cTnI also affected by systemic disease

C-TnI

• Troponin I regulates actin-myosin interaction in cardiac myocyte
• Leakage enzyme
• Increased with myocardial injury
• Increase and duration proportional to severity of myocardial damage
• Commercial labs offer
• I-STAT cartridge point-of-care test
cTnI – What Is It Useful For

- Cardiac involvement in systemic disease
  - Splenic hemangiosarcoma
  - Pericardial effusion—neoplasia vs idiopathic?
  - Arrhythmia—primary cardiac vs systemic?

- Document myocardial injury—GDV (shock), medications (doxorubicin), myocarditis, envenomation...

Cardiopet® proBNP

- Biomarker for cardiac disease
- Measures NT-proBNP
  - N-terminal pro-B-type natriuretic peptide
- Increased with myocardial wall stretch/stress
  - Causes vasodilation/naturesis/diuresis
    - reverses myocardial stretch that caused its release

NTproBNP

- BNP stored as prohormone in myocardium
- Cleaved into active BNP and NTproBNP and released into circulation in response to ventricular wall stress – stretch from volume overload, hypertrophy from pressure overload
- Test measures NTproBNP, inactive, produced in equal amount as BNP, more stable
- Increase and duration proportional to degree of cardiac disease

NTproBNP

- Inactive metabolite of proBNP
- Produced in equal amounts as active BNP
NTproBNP – What Is It Useful For

**Cat**
- Occult cardiomyopathy
- Is murmur significant?
- Determine cause of respiratory signs
- Screening at risk breeds (?)
- Drives compliance with recommendation for echo, additional workup
- NOT for breeding programs/general health screen
- Trend/monitor treatment response?

**Dog**
- Small breeds
- Cause of respiratory signs
- Significance of murmur
- Large/giant breeds
- Drives compliance
- NOT for breeding programs/general health screen
- Trend/monitor treatment response?

Cats and Murmurs

- 25-35% apparently healthy cats had murmur
- 50% of apparently healthy cats with murmur had abnormal echocardiogram
- 6% with no murmur had heart disease
- Other studies show an equal incidence, 9.4%, of Stage B heart disease whether or not murmur is present

  - V Luis Fuentes ’10, Drour ’10, Paige ’09

NTproBNP In Diagnosing CHF

- Part of diagnostic guidelines in humans (AHA)
- Distinguishing primary respiratory from cardiac disease challenging
- NTproBNP sensitive and specific for congestive heart failure (vs myocardial injury cTnI)
- Easy to perform and interpret
- SNAP® Feline proBNP petside

NTproBNP (pmol/L) And CHF In Dogs

- > 1500-1600 → CHF likely in 6-12mo
- Coughing Dogs…
  - > 2000-3000 → CHF
  - < 900, CHF unlikely
- Healthy Doberman, >500-600→ occult DCM
NTproBNP (pmol/L) And CHF In Cats

- Asymptomatic…
  - < 100 → normal
  - ≥ 100 → myocardial stretch/stress

- Respiratory signs…
  - < 270 → CHF unlikely
  - ≥ 270 → CHF likely

- 100-269 → investigate as needed

SNAP® Feline proBNP In Emergency Setting

- Respiratory distress…
  - Negative SNAP (< 100) rules out CHF
    - High negative predictive value
  - Positive SNAP (≥ 270) – echocardiogram when stable to confirm CHF

Cats When To Run NTproBNP

- To determine if cardiac or respiratory disease is the cause of respiratory distress
- To screen for occult heart disease
  - At risk breeds - Maine Coon, Ragdoll, Birman, Persian
  - Determine significance of murmur
  - Preanesthesia/prior to fluid therapy
- To determine severity of heart disease
  - ACVIM '12 abstract – differentiated mild from normal/equivocal, moderate/severe from mild/equivocal
- Not to diagnosis specific type of cardiac disease

What Else Can Raise BNP?

- Pulmonary hypertension
- Arrhythmia
- Renal disease – cleared by kidneys
- Hypertension (independent of renal disease)
<table>
<thead>
<tr>
<th>Nature’s Biomarker</th>
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<tr>
<td>• Respiratory rate most sensitive indicator of CHF in cardiac patient</td>
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<tr>
<td>• At home use &lt;30 as normal</td>
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<tr>
<td>• In clinic use &lt;40-44 as normal</td>
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