

## ProBNP

When To Use It And What It Tells You

Bill Saxon  
ACVECC, ACVIM  
IDEXX

1 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## Biomarkers

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

2 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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

3 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## cTnI

- 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

4 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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...

5 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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

6 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## NTproBNP

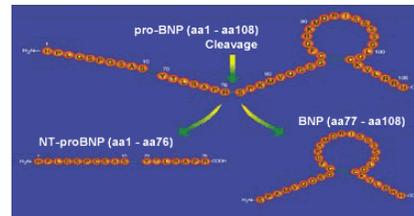
- BNP stored as prohormone in myocardium
- Cleaved into active BNP and NTproBNP and released into circulation in response to ventricular wall stress – stretch from volume overload, hypertrophy from pressure overload
- Test measures NTproBNP, inactive, produced in equal amount as BNP, more stable
- Increase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

7 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## NTproBNP

- Inactive metabolite of proBNP
- Produced in equal amounts as active BNP



8 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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?

9 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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, Drourr '10, Paige '09

10 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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 cTnl)
- Easy to perform and interpret
- SNAP® Feline proBNP petside

11 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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

12 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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

13 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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

14 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## 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

15 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## What Else Can Raise BNP?

- Pulmonary hypertension
- Arrhythmia
- Renal disease – cleared by kidneys
- Hypertension (independent of renal disease)

16 © 2014 IDEXX Laboratories, Inc. All rights reserved.



## Nature's Biomarker

- Respiratory rate most sensitive indicator of CHF in cardiac patient
- At home use <30 as normal
- In clinic use <40-44 as normal

17 © 2014 IDEXX Laboratories, Inc. All rights reserved.

