Vcheck
Canine NT-proBNP

BIONOTE Marketing team

Apr. 2020

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Vcheck Canine NT-proBNP

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01 NT-proBNP

- What is NT-proBNP?

- What NT-proBNP levels tell us

- Algorithm: NT-proBNP testing in dogs

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What is NT-proBNP?

- B-type natriuretic peptide (proBNP)

  - produced in the muscle cells of the heart

  - increases with excessive stretching of the cells

  ⇒ correlated to the severity of the underlying heart disease

- proBNP is cleaved into BNP and NT-proBNP

  (※ NT-proBNP: N-terminal pro-B type natriuretic peptide)

- NT-proBNP is stable and has a long half-life, making it a more desirable biomarker.

  ⇒ used to assess the magnitude of cardiac muscle stretching

  ⇒ proportionate to the severity of cardiac disease

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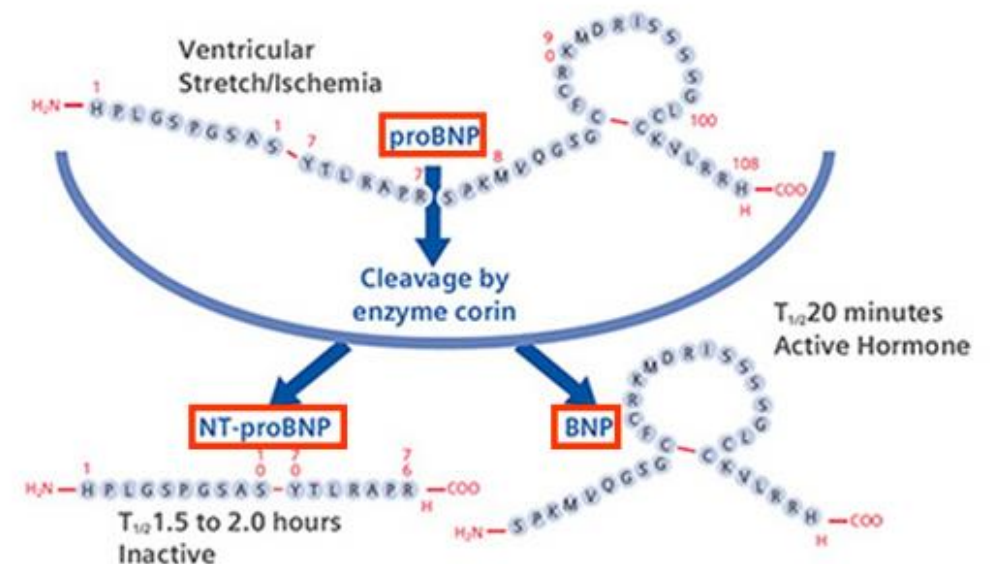
NT-proBNP in Dogs

What NT-proBNP levels tell us

▲ A dog presenting difficulty breathing (dyspnea)

- **Distinguishes cardiac from respiratory disease**
  - ✓ In dogs with dyspnea requiring emergency care
  - ✓ Differentiates cardiac and respiratory causes of respiratory signs

- **Staging of Myxomatous Mitral Valve Degeneration (MMVD)**
  - ✓ Differentiates dogs with MMVD with and without congestive heart failure
  - ✓ Chronic monitoring in dogs with MMVD

- **Detects Dilated Cardiomyopathy in Doberman Pinschers**
  - ✓ Highly sensitive and specific for detecting occult DCM
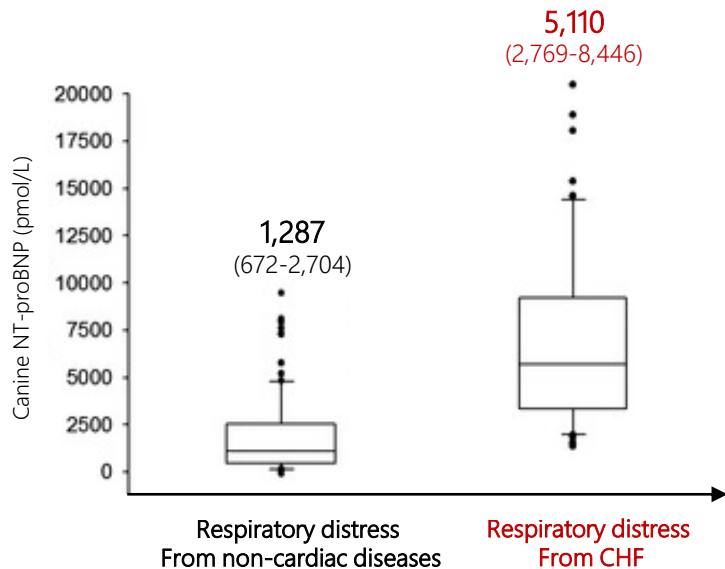 - ✓ Predicts survival in Dobermans at high risk

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Vcheck Canine NT-proBNP

What NT-proBNP levels tell us

01 Distinguishes cardiac from respiratory disease

02 Staging of Myxomatous Mitral Valve Degeneration (MMVD)

03 Detects Dilated Cardiomyopathy in Doberman Pinschers

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What NT-proBNP levels tell us

01 Distinguishes cardiac from respiratory disease

- NT-proBNP concentration was higher in CHF dogs (5,110 pmol/L) compared to those with noncardiac respiratory distress (1,287 pmol/L).

- **A cut-off >2,447 pmol/L** : Discriminates CHF from non-cardiac respiratory distress
  (**Sensitivity 81.1%**, **Specificity 73.1%**)

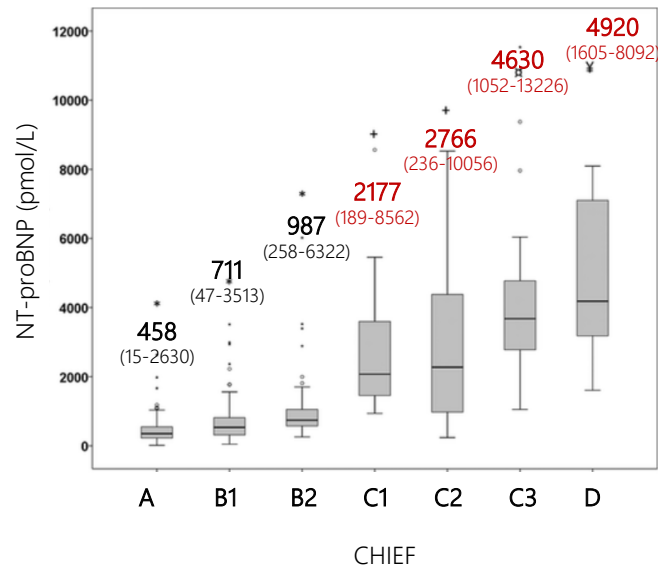- NT-proBNP biomarker is useful for discriminating CHF from non-cardiac respiratory distress.

What NT-proBNP levels tell us

01 Distinguishes cardiac from respiratory disease

02 Staging of Myxomatous Mitral Valve Degeneration (MMVD)

03 Detects Dilated Cardiomyopathy in Doberman Pinschers

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02 Staging of Myxomatous Mitral Valve Degeneration (MMVD)

- NT-proBNP in staging of MMVD in dogs

◀ In dogs with MMVD categorized according to the CHIEF classification
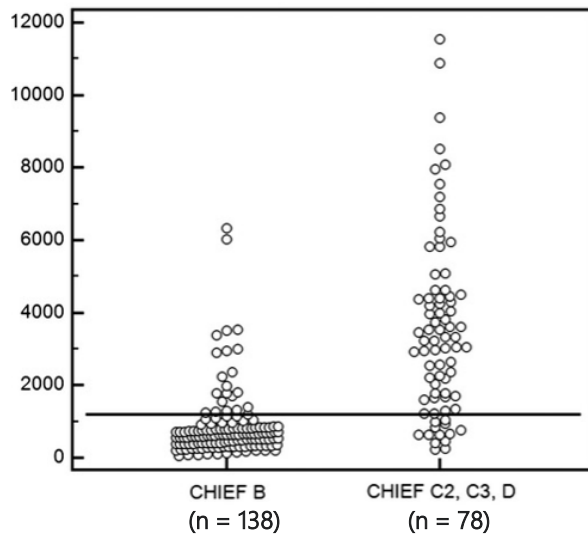
CHIEF	Interpretation
A	Control
B1, B2	MMVD only
C2, C3, D	MMVD + CHF

⇒ NT-proBNP values of all disease stages (B1-D)

were significantly higher than NT-proBNP of the control group.

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What NT-proBNP levels tell us

02 Staging of Myxomatous Mitral Valve Degeneration (MMVD)

- NT-proBNP in staging of MMVD in dogs

◄ Sensitivity and specificity of NT-proBNP at diagnostic cut-off values of 1207 pmol/L

CHIEF	Interpretation
A	Control
B1, B2	MMVD only
C2, C3, D	MMVD + CHF

Cut-off 1207.5

- Sens: 83.3 %
- Spec: 84.8 %

In canine MMVD, NT-proBNP is useful to discriminate between asymptomatic dogs and dogs with CHF.

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What NT-proBNP levels tell us

01 Distinguishes cardiac from respiratory disease

02 Staging of Myxomatous Mitral Valve Degeneration (MMVD)

03 Detects Dilated Cardiomyopathy in Doberman Pinschers

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03 Detects Dilated Cardiomyopathy in Doberman Pinschers

▲ 24-hour Holter monitoring

- Diagnostic utility of NT-proBNP assay

▼ Diagnostic utility of NT-proBNP assay and Holter for the detection of ODCM in 155 Dobermans

Criteria	Se	Sp	PPV	NPV	Accuracy
NT-proBNP > 457	69.9	80.5	76.1	75.0	75.5
NT-proBNP > 900	32.9	93.9	82.8	61.1	65.2
Holter, NT-proBNP, or both > 457	94.5	87.8	87.3	94.7	91.0
Holter, NT-proBNP, or both > 900	84.9	95.1	93.9	87.6	90.3

→ The combination of NT-proBNP assay and Holter detects ODCM with high accuracy

- Combination of NT-proBNP and Holter to detect ODCM yielded **sensitivity of 94.5%, specificity of 87.8%, and accuracy of 91.0%.** (the presence of > 50 VPCs during Holter)

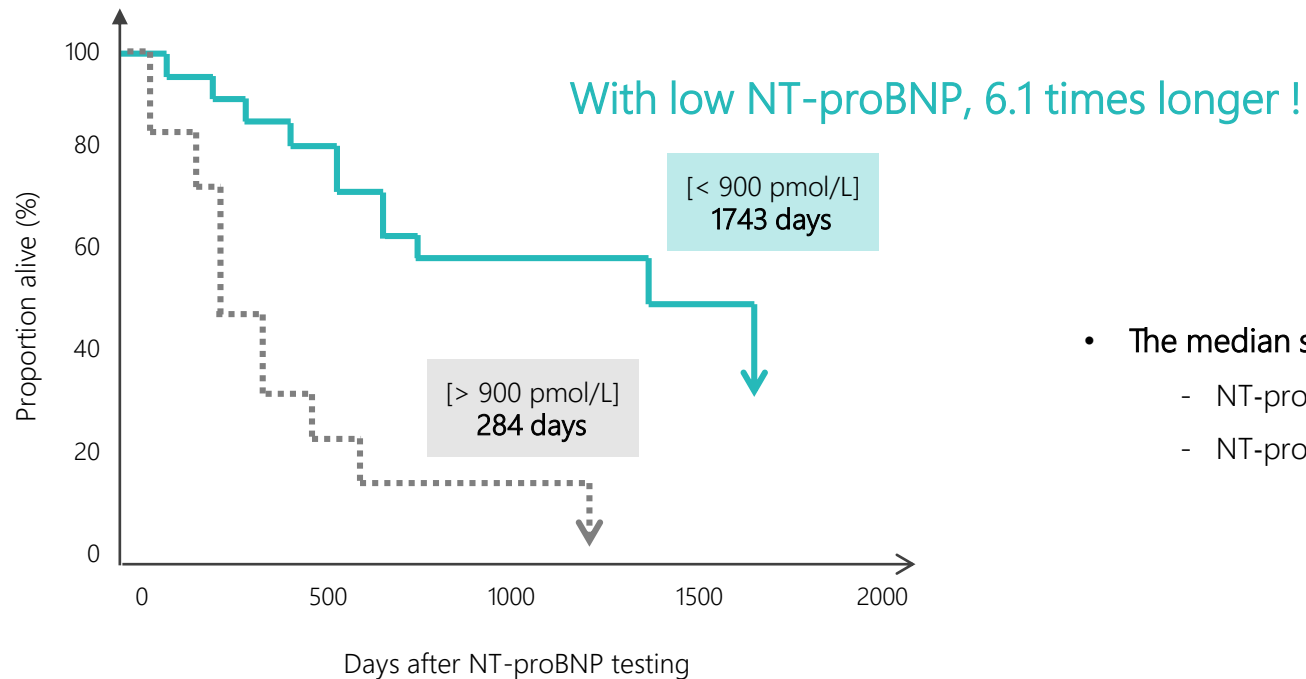CHIEF: Canine Heart failure International Expert Forum
J Vet Intern Med. 2012;26:1330-1336.
Vet Clin Pathol. 2013 Jun;42(2):196-200.

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What NT-proBNP levels tell us

03 Detects Dilated Cardiomyopathy in Doberman Pinschers

- Diagnostic utility of NT-proBNP assay

With low NT-proBNP, 6.1 times longer !

[< 900 pmol/L]
1743 days

[> 900 pmol/L]
284 days

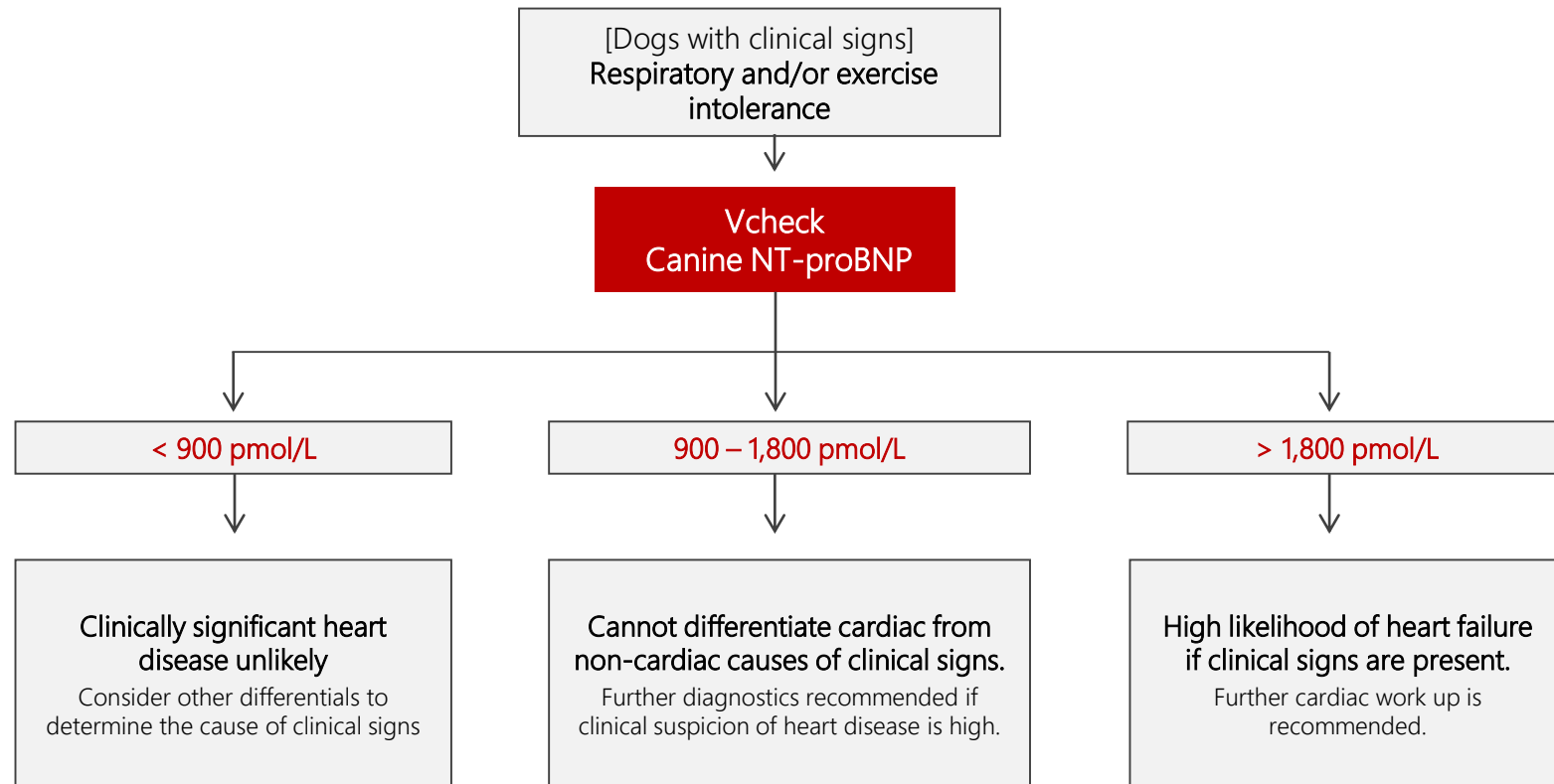Proportion alive (%)

Days after NT-proBNP testing

- The median survival time of Dobermans:
  - NT-proBNP > 900 pmol/L: 284 days (<u>6.1 times shorter</u>)
  - NT-proBNP < 900 pmol/L: 1743 days

J. Vet. Intern. Med. 2012a;26:1330–1336.

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NT-proBNP in Dogs

Algorithm: NT-proBNP testing in dogs

```
              ┌─────────────────────────────┐
              │   [Dogs with clinical signs] │
              │  Respiratory and/or exercise │
              │         intolerance          │
              └─────────────────────────────┘
                            │
                            ▼
              ┌─────────────────────────────┐
              │           Vcheck            │
              │     Canine NT-proBNP        │
              └─────────────────────────────┘
```

< 900 pmol/L	900 – 1,800 pmol/L	> 1,800 pmol/L
Clinically significant heart disease unlikely	**Cannot differentiate cardiac from non-cardiac causes of clinical signs.**	**High likelihood of heart failure if clinical signs are present.**
Consider other differentials to determine the cause of clinical signs	Further diagnostics recommended if clinical suspicion of heart disease is high.	Further cardiac work up is recommended.

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02 Product Introduction

Vcheck Canine NT-proBNP

- Specifications
- Key Features
- Test Procedure
- Reference Range
- Performance

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Vcheck Canine NT-proBNP

- Specifications

✓ **Species** : Dog

✓ **Sample** : Serum 100 μl

✓ **Testing Time** : 15 minutes

✓ **Measurement** : Quantitative

✓ **Measurement Range** : 500 – 10,000 pmol/L

✓ **Storage Condition** : 2 - 8 °C

Product No.	Product Name	Product Type	Packing Unit
VCF132DC	Vcheck Canine NT-proBNP	Device	5 Tests/Kit

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Vcheck Canine NT-proBNP

- Key Features

  ✓ **Quantitative Analysis**
    Actual results (instead of an estimate like others)

  ✓ **Proven Accuracy and Reproducibility**
    Correlated against an ELISA method from laboratories

  ✓ **Rapid and accurate results**
    Simple procedure and quick results within 15 min.
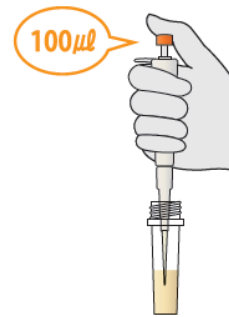
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Vcheck Canine NT-proBNP

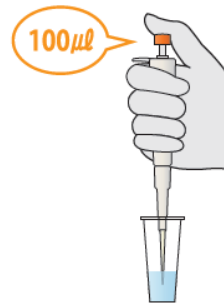- ## Test Procedure

  ✓ Samples should be centrifuged and tested immediately after collection.
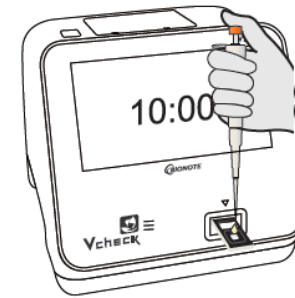   Alternatively, refrigerate and use within 24 hours or freeze.

    * Degradation of NT-proBNP may occur if stored at room temperature or refrigerated for more than 24 hours, causing false negative results.

| Add 100 μl of the sample to the assay diluent tube | Mix well by using a 100 μl pipette | Add the mixed sample (100 μl) |

* Stored samples should be placed at room temperature 30 min. before use.

Vcheck Canine NT-proBNP

- Reference Range

< 900 pmol/L	900 – 1,800 pmol/L	> 1,800 pmol/L
Normal	Suspected* Additional diagnostics are recommended	Abnormal* Additional diagnostics are recommended

* 'Abnormal' or 'Suspected' NT-proBNP test results should always be interpreted in combination and other diagnostic findings, such as an echocardiogram.

** Concentration over 735 pmol/L in Doberman Pinschers indicates an increased risk for occult dilated cardiomyopathy.
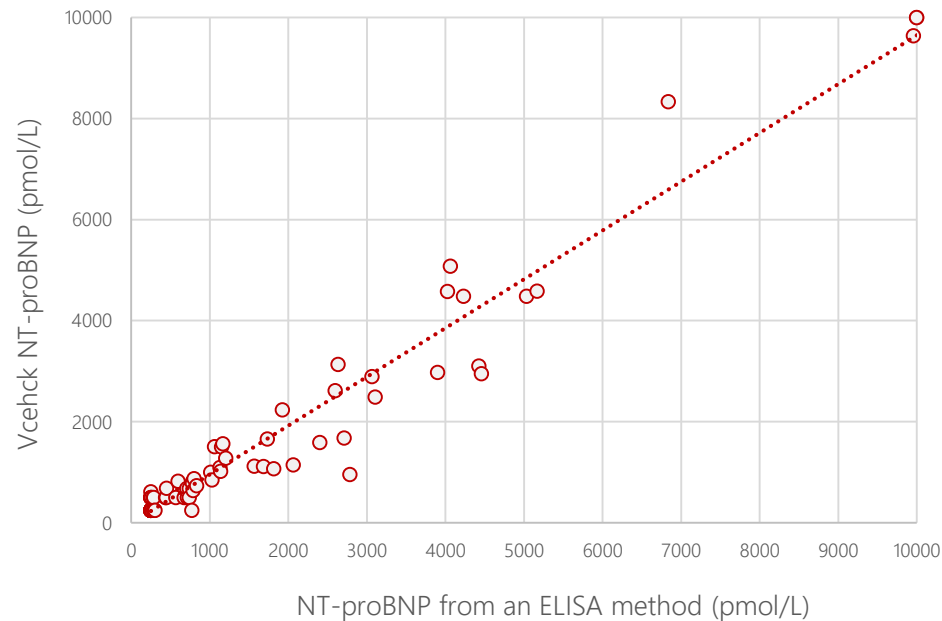
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- ## Performance

Comparative evaluation of Canine NT-proBNP

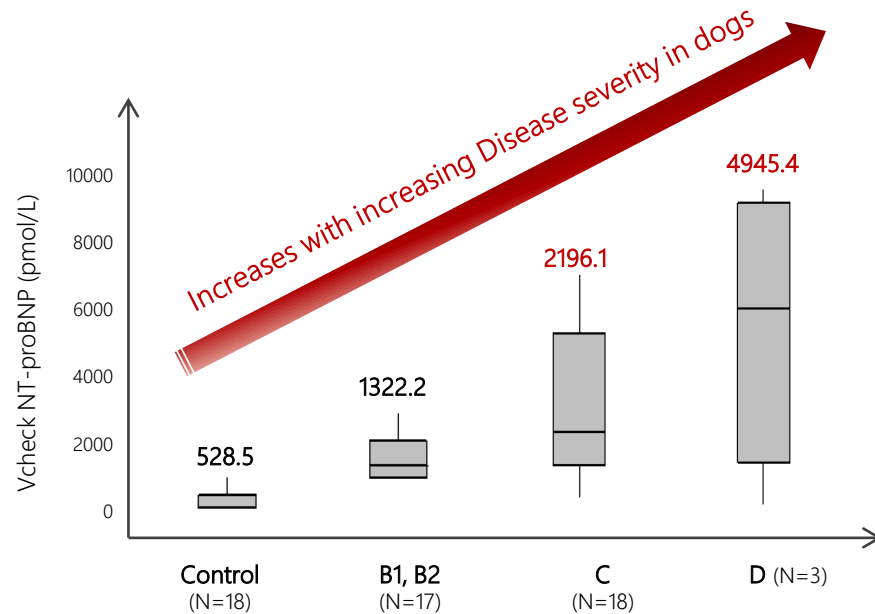✓ Vcheck Canine NT-proBNP has a strong correlation (R^2=0.952) with an ELISA method (from company 'I' lab)

$y = 0.9658x - 11.299$
$R^2 = 0.9521$

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Vcheck Canine NT-proBNP

- ### Performance

NT-proBNP levels based on stages of ACVIM System

MMVD Stage By ACVIM (American College of Veterinary Internal Medicine)	
Control	Predisposed to heart disease
Stage B1, B2	Asymptomatic (+ Left heart volume increased)
Stage C	CHF signals
Stage D	Terminal stage

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Thank you

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