Vcheck
Feline NT-proBNP

BIONOTE Marketing team

Jan. 2020

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Vcheck Feline NT-proBNP

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01 NT-proBNP

- What is NT-proBNP?

- What NT-proBNP levels tell us

- How can I use the NT-proBNP test?

- Algorithm: NT-proBNP testing in cats

- Factors which increase NT-proBNP concentration

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What is NT-proBNP?

- B-type natriuretic peptide (BNP)
  - 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
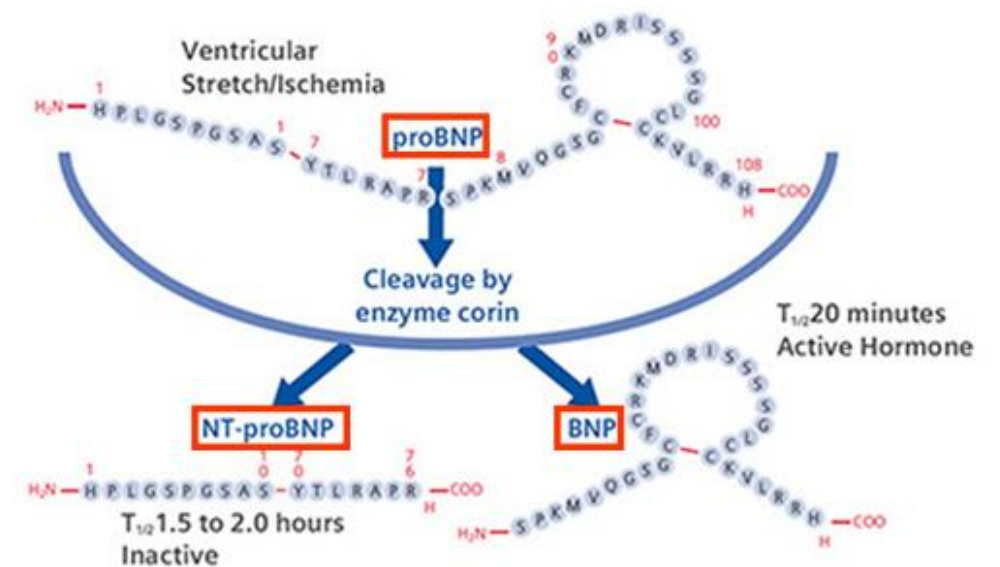
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NT-proBNP in Cats

What NT-proBNP levels tell us

- **To screen for occult heart disease**
  - ✓ Before anesthesia
  - ✓ In apparently healthy cats with heart murmurs
  - ✓ At risk breeds - Maine Coon, Ragdoll, Birman, Persian, etc.

- **To determine Cardiac or Respiratory disease**
  - ✓ In cats with respiratory signs such as dyspnea, tachypnea, cough
  - ✓ To differentiate cardiac and respiratory causes of dyspnea

- **To determine the severity of heart disease**
  - ✓ For monitoring stabilization of CHF during hospitalization
  - ✓ For predicting survival in cats with CHF
    * CHF: Congestive Heart Failure

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NT-proBNP in Cats

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- To determine Cardiac or Respiratory disease
  - ✓ In Cats with respiratory signs such as dyspnea, tachypnea, cough
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- To determine severity of heart disease
  - ✓ For monitoring treatment in cats with CHF   *CHF: Congestive Heart Failure
  - ✓ For predicting prognosis

HCM Hypertrophic Cardiomyopathy

- ✓ Most prevalent feline cardiac disorder
- ✓ Affected Age: **2, 3 year-old** (3 months ~ 10 years)
- ✓ Process: Thick left ventricular muscle
  → Decreased volume size in left ventricle
- ⇒ Congestive Heart Failure (CHF), Thromboembolism

Normal heart (cross section)   Hypertrophic cardiomyopathy
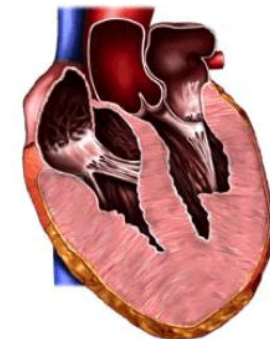
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NT-proBNP in Cats

How can I use the NT-proBNP test?

01 Comprehensive Evaluation (In Cats without clinical signs)

✓ **In cats at increased risk of having occult cardiomyopathy**
   e.g. heart murmur, gallop heart sound, arrhythmia

✓ **In high-risk cat breeds,**
   e.g. Maine Coon, Ragdoll, Birman, Persian, American Short Hair, Himalayan, Siamese, Sphinx, Burmese, etc.

- NT-proBNP may help the veterinarian assess the <u>likelihood of underlying heart disease in asymptomatic cats</u> and guide the next diagnostic and therapeutic steps. ⇒ Echocardiogram should be performed for the definite diagnosis.
- <u>NT-proBNP assay was **91.2% specific** and **85.8% sensitive** for detection of underlying heart disease based on findings from echocardiographic examination.</u> *J Vet Intern Med 2011; in press.*

- +) Although NT-proBNP levels is less than 100 pmol/L, high-risk cats should be re-evaluated annually.

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△ a cat having difficulty in breathing

NT-proBNP in Cats

How can I use the NT-proBNP test?

02 In Cats with Respiratory signs

✓ The presence of respiratory signs (dyspnea, tachypnea, cough)

- <u>Cardiac disease</u>: underlying cardiomyopathy and congestive heart failure (CHF)

- <u>Primary respiratory disease</u>: bronchitis/asthma, pneumonia, neoplasia, pleural space disease

- NT-proBNP testing is a useful option to rapidly assess <u>the likelihood that heart disease is present in a cat with respiratory signs</u>.

- In cats with respiratory signs such as dyspnea, tachypnea and cough, <u>if the NT-proBNP is >270 pmol/L, CHF is the most likely cause of the clinical signs</u>. (Concurrent respiratory disease cannot be still ruled out.)

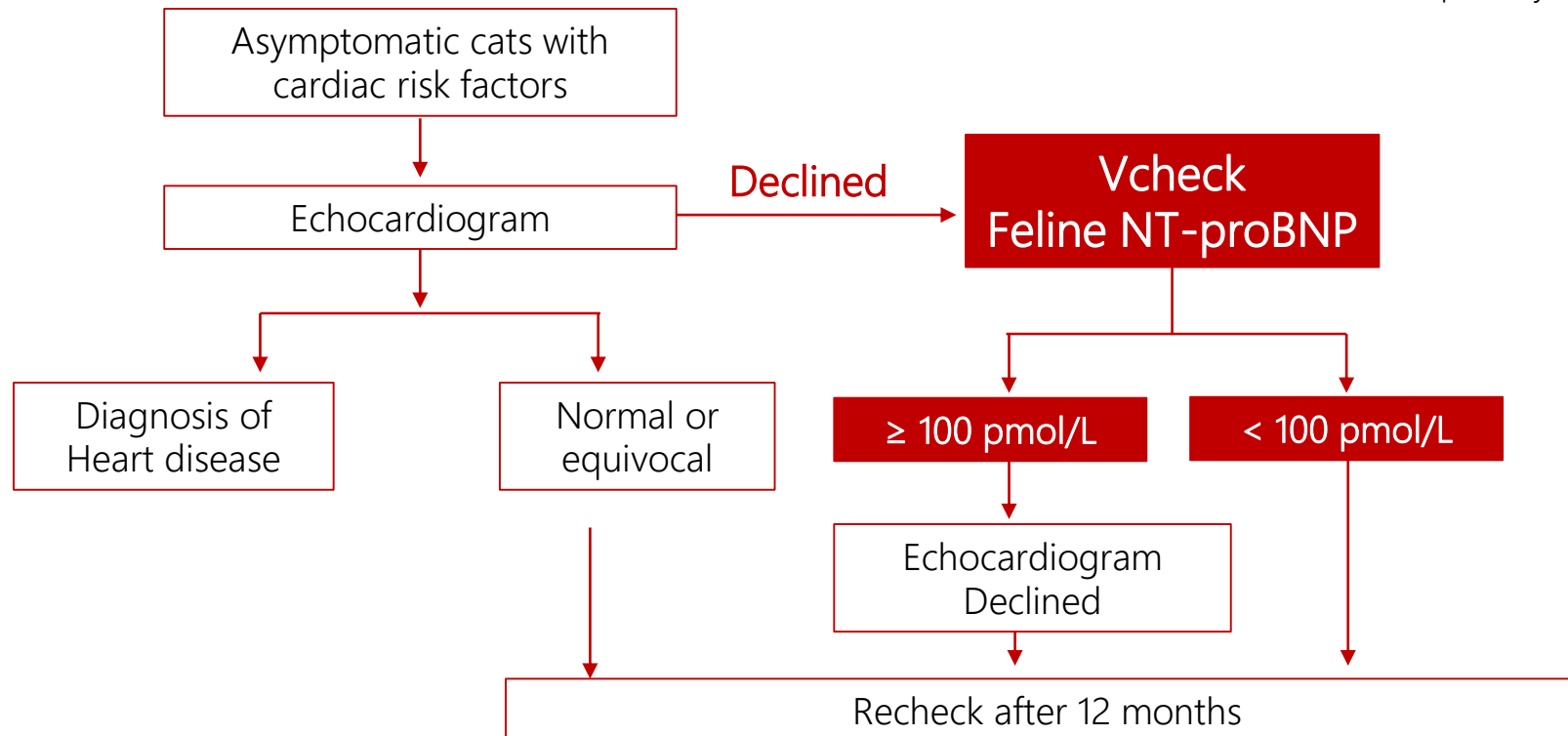- Cutoff value of 265 pmol/L: <u>Sensitivity of 90.2%</u> and <u>Specificity of 87.9%</u>

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NT-proBNP in Cats

Algorithm: NT-proBNP testing in cats

- **In cats with respiratory signs such as dyspnea, tachypnea and cough,**

  If the NT-proBNP is >270 pmol/L,

  Congestive heart failure is the most likely cause of the clinical signs.

  (However, concurrent respiratory disease cannot be ruled out.)

```
Asymptomatic cats with
cardiac risk factors
        |
        v
Echocardiogram  --Declined-->  Vcheck Feline NT-proBNP
        |                              |
   +----+----+              +----------+----------+
   v         v              v                     v
Diagnosis  Normal or    ≥ 100 pmol/L          < 100 pmol/L
of Heart   equivocal         |                     |
disease        |             v                     |
               |       Echocardiogram              |
               |         Declined                  |
               |             |                     |
               +-------------+---------------------+
                             v
                  Recheck after 12 months
```

By Dr. Sonya G Gordon (Cardiac Education Group)

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NT-proBNP in Cats

✓ NT-proBNP is not a stand-alone test

✓ NT-proBNP should be interpreted when used in conjunction with findings from the <u>history</u>, <u>physical examination</u>, <u>ECG</u>, auscultation, thoracic <u>radiography</u> and <u>echocardiography</u> ⇒ Helping achieve a definite diagnosis

Having a 'biomarker'-guided therapy may be very important as a complement to other testing in cats
to improve the accuracy and confidence <u>in diagnosing heart disease</u> or <u>making treatment decisions</u> for cats with CHF.

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NT-proBNP in Cats

When NT-proBNP was measured,

More accurate the diagnosis is!
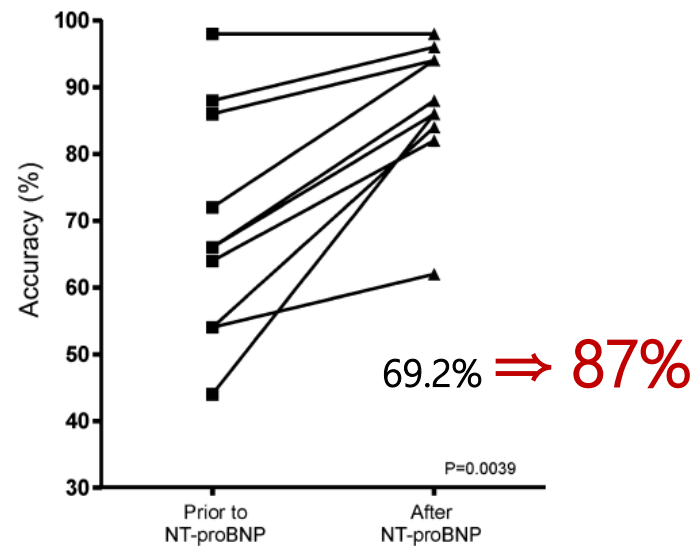
Much higher the confidence score is!

69.2% ⇒ 87%

Fig 1. Accuracy of general practitioners' diagnosis in cats with respiratory signs

Score 6 ⇒ Score 8
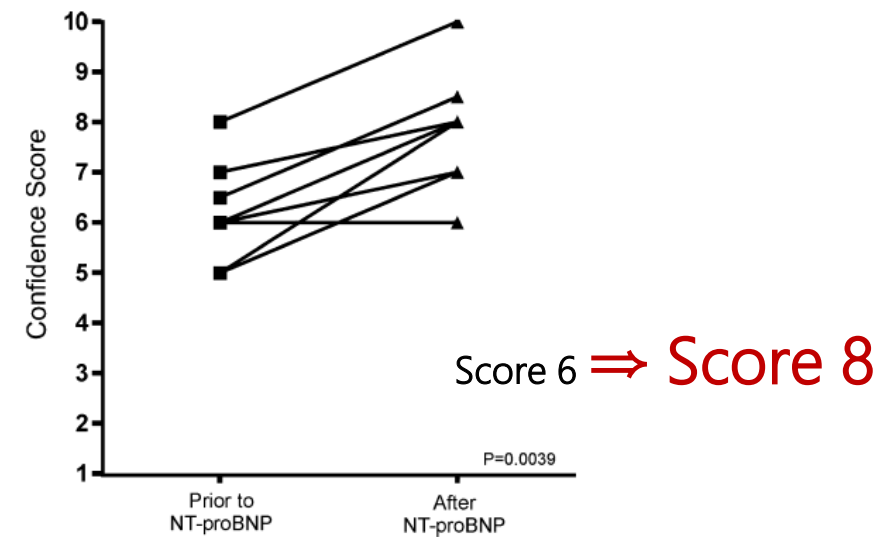
Fig 2. Confidence of general practitioners' diagnosis in cats with respiratory signs

J Vet Intern Med 2012;26:542–546

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NT-proBNP in Cats

Factors which increase NT-proBNP concentrations

- Feline Hyperthyroidism

- Renal insufficiency or Pre-renal azotemia

  ⇒NT-proBNP levels should be interpreted in the context of renal function tests.

  (creatinine > 2.8)

- Systemic hypertension

- Severe arrhythmias

- Pulmonary hypertension (rare)

Elevated
NT-proBNP concentrations

+

Normal
Echocardiogram

||

Consider these factors
which increase NT-proBNP levels!

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02 Product Introduction

Vcheck Feline NT-proBNP

- Specifications

- Key Features

- Test Procedure

- Reference Range

- Performance

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Vcheck Feline NT-proBNP

- Specifications

    ✓ **Species** : Cat

    ✓ **Sample** : Serum, Plasma (Heparin, EDTA) 100 μl

    ✓ **Testing Time** : 10 minutes

    ✓ **Measurement** : Quantitative

    ✓ **Measurement Range** : 50 – 1,500 pmol/L

    ✓ **Storage Condition** : 1 - 30 °C

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Vcheck Feline NT-proBNP

- ### Key Features

  ✓ **Quantitative measurement**

    Quantifies the degree of elevation in NT-proBNP for an accurate evaluation

  ✓ **High correlation with company 'I' lab**

    Vcheck Feline NT-proBNP has a high correlation (R² = 0.96) with company 'I' laboratory.

  ✓ **A wide range of measurement**

    Measures up to 1500 pmol/L

  ✓ **A user-friendly procedure & Fast results**

    Simple one-step procedure, improving user convenience, and quick results within 10 min.


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Vcheck Feline 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.
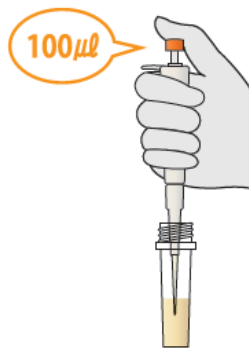
Add 100 µl of the sample to the assay diluent tube

Mix well by using a 100 µl pipette
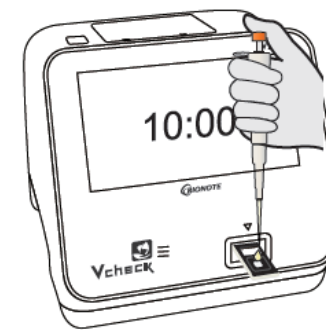
Add the mixed sample (100 µl) into the test device

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

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Vcheck Feline NT-proBNP

- Reference Range

| < 100 pmol/L	≥ 100 pmol/L
Normal	Abnormal Additional diagnostics are recommended

- A positive NT-proBNP test result should always be interpreted in combination and other diagnostic findings.

- In cats with respiratory signs, if the NT-proBNP is >270 pmol/L, CHF is the most likely cause of the clinical signs.

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Vcheck Feline NT-proBNP

- Performance

Comparative evaluation of feline NT-proBNP (N=37)

$y = 1.0211x + 8.4432$
$R^2 = 0.9645$
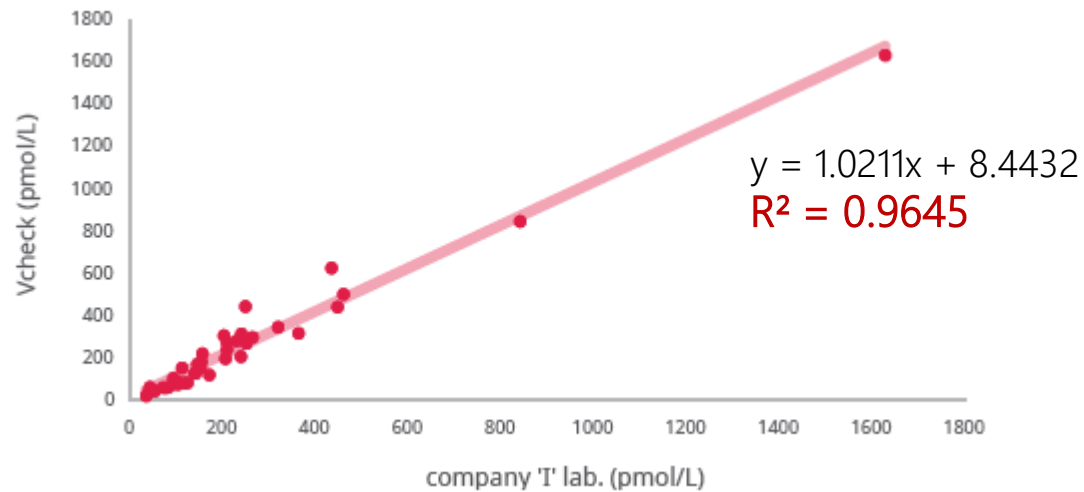
Reproducibility

CV < 15%

Accuracy

Bias < 20%

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Reference

Reference

1. Mark Oyama. Cardiac Blood Tests in Cats: Another Tool for Detection of Heart Disease. Today's Veterinary Practice. September/October 2011
2. Natalie Stilwell, MVC 2018: Advances in Feline Heart Disease Diagnosis
3. Connolly DJ, Soares Magalhaes RJ, Fuentes VL, et al. Assessment of the diagnostic accuracy of circulating natriuretic peptide concentrations to distinguish between cats with cardiac and non-cardiac causes of respiratory distress. J Vet Cardiol 2009;11(Suppl 1):S41–S50
4. K.V. Pierce, J.E. Rush, V.K. Yang, et al. Association between Survival Time and Changes in NT-proBNP in Cats Treated for Congestive Heart Failure. J Vet Intern Med. 2017 May-Jun; 31(3): 678-684.
5. Dr. Sonya G Gordon. Cardiac Education Group. October 2014
6. Fox PR, Rush JE, Reynolds CA, et al. Multicenter evaluation of plasma N-terminal pro-brain natriuretic peptide (NT-pro BNP) as a biochemical screening test for asymptomatic (occult) cardiomyopathy in the cat. J Vet Intern Med 2011; in press.
7. Connolly, DJ , et al. The effect of protease inhibition on the temporal stability of NT-proBNP in feline plasma at room temperature. J Vet Cardiol 2011;13:13–19.

Product No.	Product Name	Product Type	Packing Unit
VCF130DC	Vcheck Feline NT-proBNP	Device	5 Tests/Kit

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Thank you

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