

Vcheck Cardiac marker NT-proBNP & Tnl

BIONOTE Overseas Sales Department

2022.July

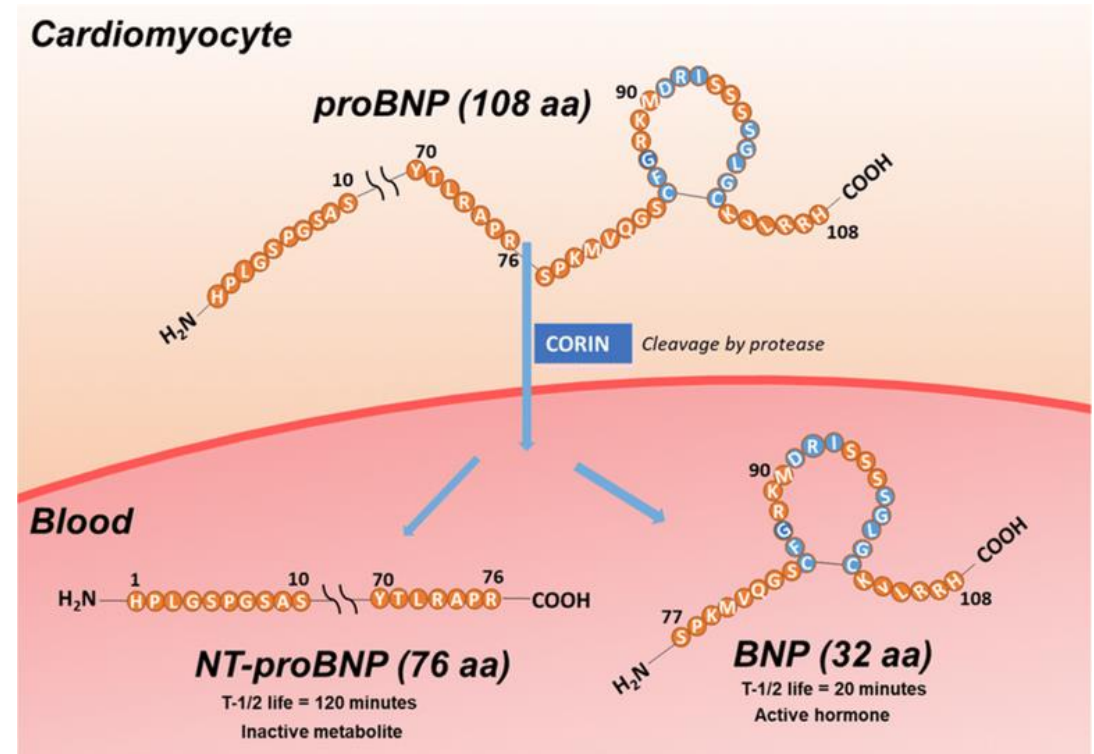
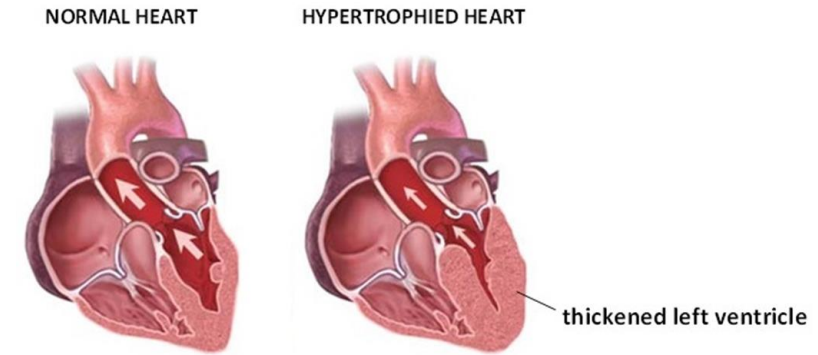


01 NT-proBNP

- What is NT-proBNP?
- NT-proBNP in Cats
- Nt-proBNP in Dogs
- When can we use NT-proBNP test?

What is NT-proBNP?

- **pro 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**

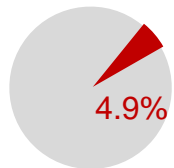


Feline Heart Disease: HCM

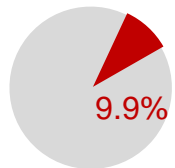
Hypertrophic Cardiomyopathy (HCM)

The most common heart disease, one of the 10 most common causes of death in cats

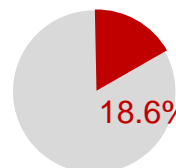
- **Prevalence**¹: 15% in the general cat population, up to 29% in older cats (In apparently healthy cats)



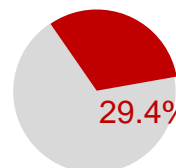
Juvenile (6-12m)



Young (1-3 years)

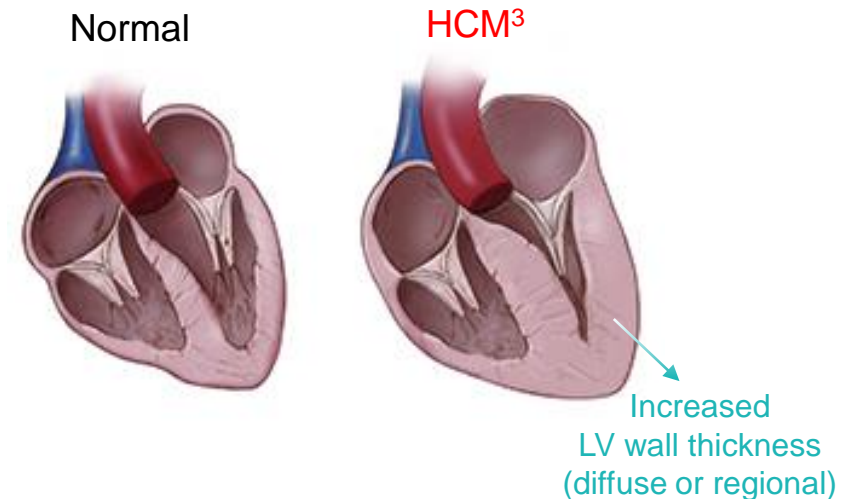


Adult (3-9 years)



Senior (≥9 years)

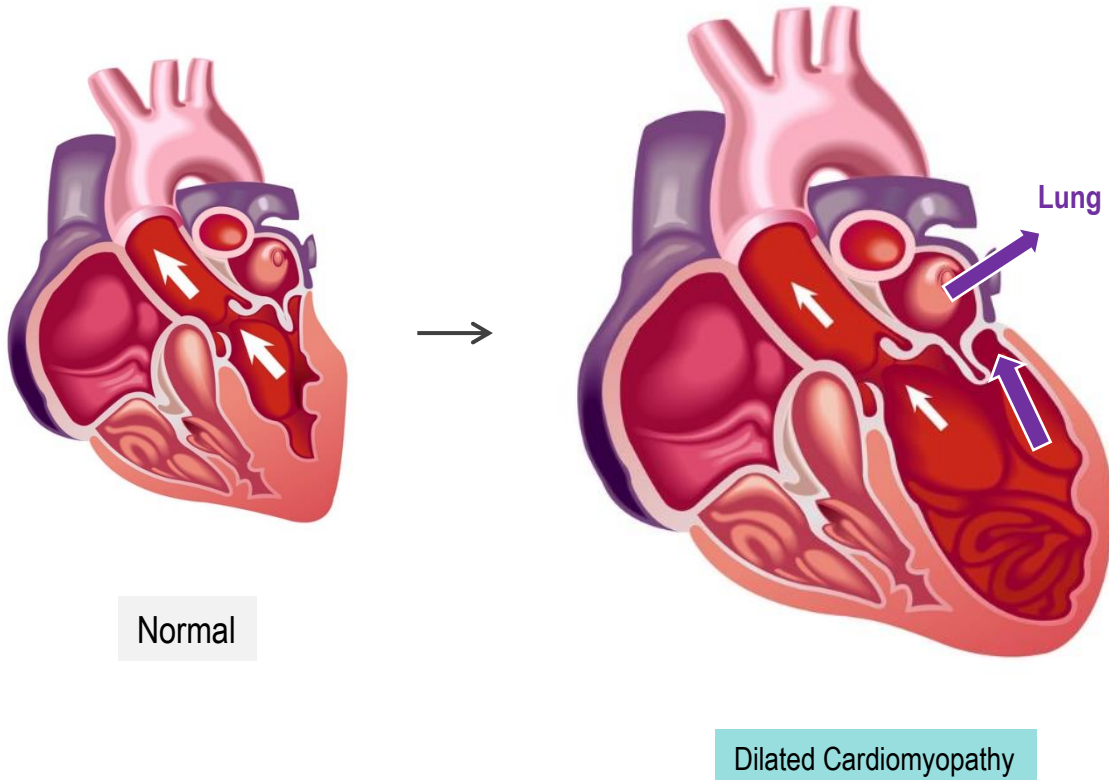
- **Clinical signs:** **no symptoms**, labored breathing
- **Diagnosis:** Echocardiography; LV wall ≥ 6 mm



Canine Heart Disease: DCM



- Dilated Cardiomyopathy (DCM)



The most common cause of heart disease in large breeds
(10% of all heart disease)

Ventricular wall thinning; Heart muscle loses its contraction ability



The pressure of the blood inside the heart causes the wall to stretch

👉 Increasing NT-proBNP levels



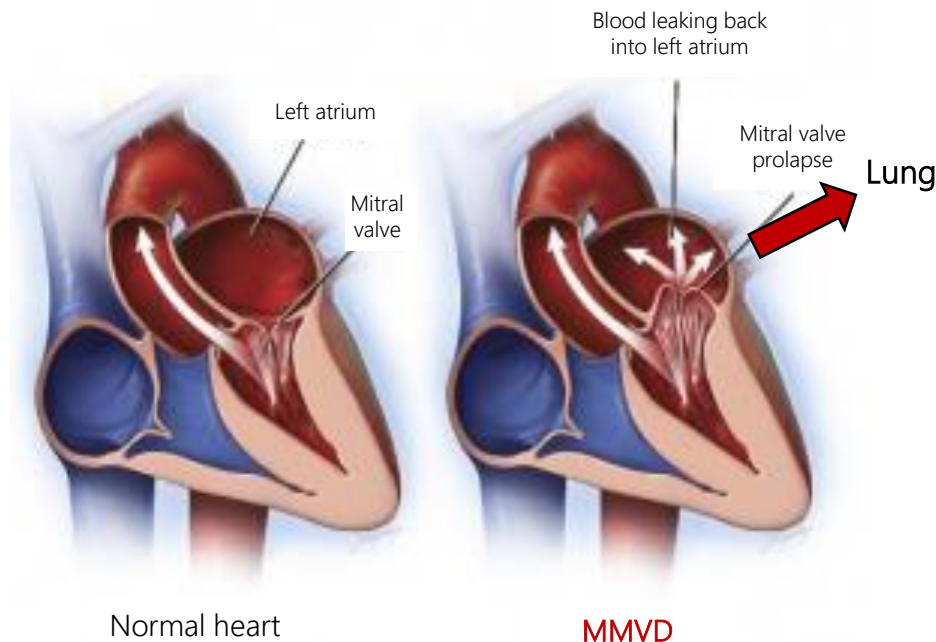
Results in an enlarged heart



Can cause heart failure (pulmonary edema)

Canine Heart Disease: MMVD

- **Myxomatous Mitral Valve Degeneration (MMVD)**



Over time, the heart muscle “wears out”

- ✓ **Most common heart disease**

(> 70% of all cardiovascular disease in dogs)

- **Age:** Older dogs
- **Breeds at elevated risk:** Small or toy breeds (< 9 kg)
 - Cavalier King Charles (Very high incidence)

- ✓ **Pathophysiology (left heart)**

- ① As dogs age, the valve becomes thickened
- ② It starts to leak backwards [👉 MMVD](#)
- ③ Abnormally high pressure
- ④ Could lead to pulmonary edema [👉 Heart failure](#)

NT-proBNP in Cats & Dogs

When can We use the NT-proBNP test?



CAT

- ✓ Without an apparent clinical signs
- ✓ In cats at increased risk of having cardiomyopathy
- ✓ The presence of respiratory signs
e.g. dyspnea, tachypnea, cough
- ✓ In high-risk cat breeds,
e.g. Maine Coon, Ragdoll, Birman, Persian, American Short Hair



DOG

- ✓ Asymptomatic DCM dogs in large breeds
- ✓ Verify severity of MMVD patients from low-stage
- ✓ Distinguishes cardiac from respiratory disease

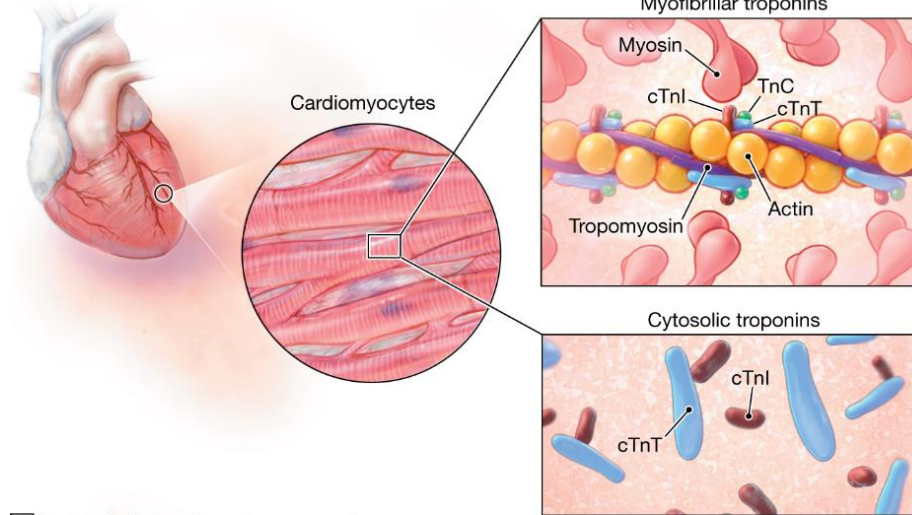
02 TnI (Feline & Canine)

- What is TnI?
- Utility of TnI Test
- Cardiac Biomarker with NT-proBNP

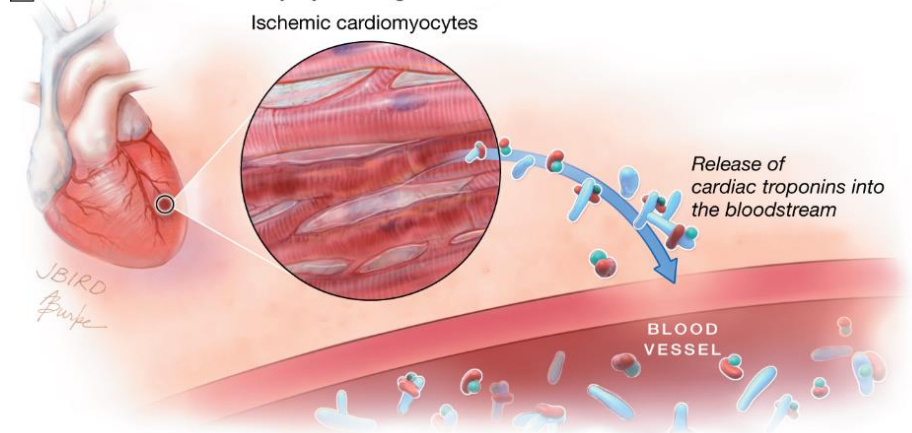
What is TnI?

What is TnI?

[A] Structure of cardiac troponins



[B] Ischemia-induced cardiomyocyte damage



In the Heart Muscle,
The contractile apparatus is composed of ...

- **Actin**
- **Myosin**
- **Tropomyosin**
- **Troponin complex** (Regulatory proteins)
 - 1) Troponin T: binds to Tropomyosin
 - 2) Troponin C: binds to Ca^{2+}
 - 3) **Troponin I**: inhibits the interaction

✓ Troponin I (TnI): cardiac, skeletal isoforms

→ Only measures cardiac TnI

✓ **Cardiac TnI is a more sensitive marker of myocardial injury** when compared to cardiac TnT.

Cardiac marker in Cats (Troponin I)

In Cats,

What Troponin I levels tell us

1) Screening for HCM in apparently healthy cats

- Troponin I **reflects myocardial damage as a consequence** of developing HCM.
- “Troponin I might be considered for differentiating between normal cats and cats with subclinical HCM when cardiac disease is suspected” (Level of evidence: medium)



2) Predictor of cardiac death in cats with HCM

- **Troponin I:** cut-off 0.7 ng/ml → Hazard ratio 5 (independent of the presence of CHF or LA dilatation)
- “An increased TnI concentration is associated with increased risk of cardiovascular death” (Level of evidence: high)



Cardiac marker in Dogs (Troponin I)

In Dogs,

What Troponin I levels tell us



Cardiac Trauma

- hit-by-car trauma
- high-rise syndrome
- thoracic bite injuries

TnI for detecting or ruling out significant blunt cardiac injury



Heart Disease

- mitral valve disease (MMVD)
- cardiomyopathy (DCM)
- congenital heart disease

TnI for signifying ongoing myocardial injury (worsening of cardiac function)



Non-Cardiac Disease

- inflammatory diseases
- neoplasia
- shock

TnI for discovering myocardial injury in critically ill individuals

Cardiac Biomarkers NT-proBNP & TnI

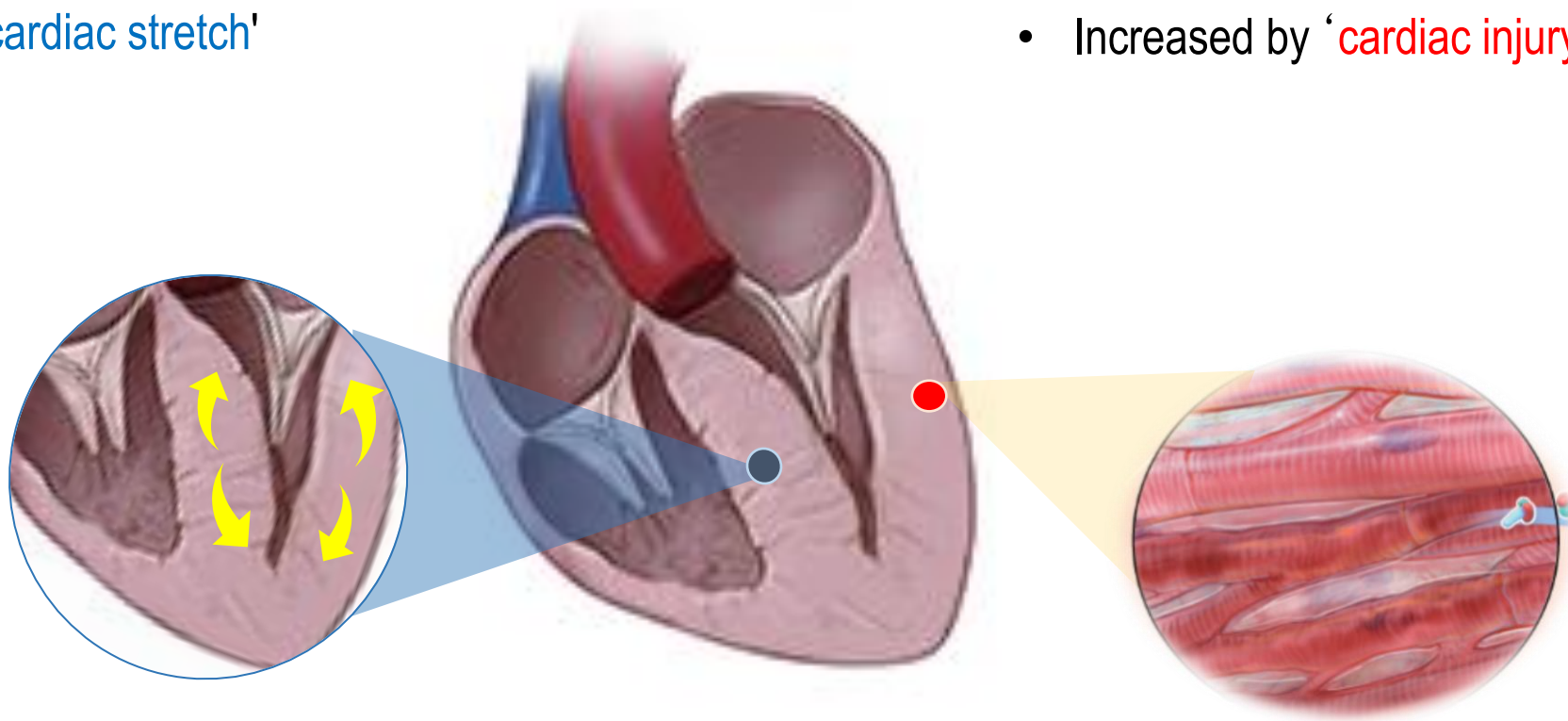
Two Useful Cardiac markers in Cats & Dogs

✓ NT-proBNP

- Plays a role in cardiovascular homeostasis
- Increased by 'cardiac stretch'

✓ Troponin I

- Plays a role in cardiomyocyte contraction
- Increased by 'cardiac injury itself'



Diagnosis of Heart Diseases

How can we diagnose heart diseases?

- **Auscultation:** Even cats with heart disease may not have a murmur, and healthy cats may also have a heart murmur.
 - ※ Sometimes it helps, but the usefulness of diagnosing heart disease is low.
- **ECG (Electrocardiogram):** To check for arrhythmia (esp. ventricular arrhythmia)
 - ※ The usefulness of diagnosing heart disease is relatively low.
- **Radiography:** Difficult to identify cardiac hypertrophy in cats
 - ※ The usefulness of diagnosing heart disease is low.
- **Echocardiogram:** Reference method for diagnosis, Accurate evaluation of the severity of heart disease is possible.
But, it is relatively expensive and requires specialized equipment.
 - ※ Difficult to perform on a daily basis

03 Product Introduction

Vcheck NT-proBNP & TnI

- Specifications
- Test Procedure & Reference Range

Vcheck NT-proBNP

Vcheck NT-proBNP Specifications



- ✓ **Species** : Cat
- ✓ **Sample** : Serum 100 µl
- ✓ **Testing Time** : 10 minutes
- ✓ **Measurement** : Quantitative
- ✓ **Measurement Range** : 50 – 1,500 pmol/L
- ✓ **Storage Condition** : 1 - 30 °C



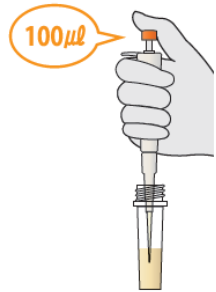
- ✓ **Species** : Dog
- ✓ **Sample** : Serum 100 µl
- ✓ **Testing Time** : 15 minutes
- ✓ **Measurement** : Quantitative
- ✓ **Measurement Range** : 500 – 10,000 pmol/L
- ✓ **Storage Condition** : 2 - 8 °C

Vcheck NT-proBNP

Test Procedure & Reference range

The samples should be tested immediately after collection.

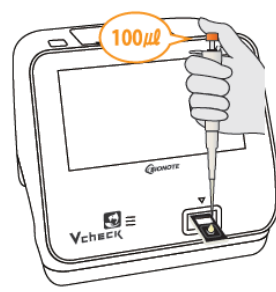
If serum samples are not tested immediately, freeze the serum for storage (-20°C or colder).



Add 100 µl of the sample to the assay diluent tube



Mix well 5-6 times



Add the mixed sample (100 µl)

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

Feline NT-proBNP

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

Canine NT-proBNP

< 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.

Vcheck Troponin I

Vcheck Troponin I Specifications



- ✓ **Species** : Cat
- ✓ **Sample** : Serum 100 µl
- ✓ **Testing Time** : 10 minutes
- ✓ **Measurement** : Quantitative
- ✓ **Measurement Range** : 0.01 – 20 ng/mL
- ✓ **Storage Condition** : 1 - 30 °C



- ✓ **Species** : Dog
- ✓ **Sample** : Serum 100 µl
- ✓ **Testing Time** : 10 minutes
- ✓ **Measurement** : Quantitative
- ✓ **Measurement Range** : 0.01- 20 ng/mL
- ✓ **Storage Condition** : 1 - 30 °C

Vcheck Troponin I

Test Procedure & Reference range

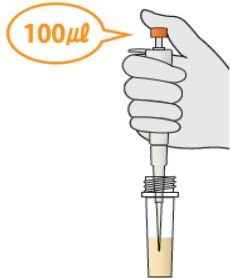
The samples should be tested immediately after collection!

If serum samples are not tested immediately, freeze the serum for storage (-20°C or colder).

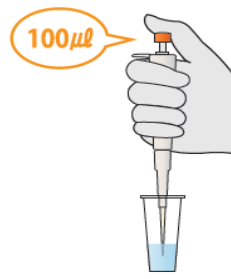


Samples should be tested immediately after collection.

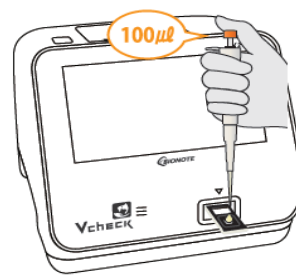
(If not, freeze the samples at -20 °C or below for storage. Do not freeze and thaw repeatedly.)



Add 100 µl of the sample to the assay diluent tube



Mix well 5-6 times



Add the mixed sample (100 µl)

Feline Tnl

REFERENCE RANGE

< 0.18 ng/ml	0.18~0.28 ng/ml	> 0.28 ng/ml
Normal	Suspected	Abnormal

Canine Tnl

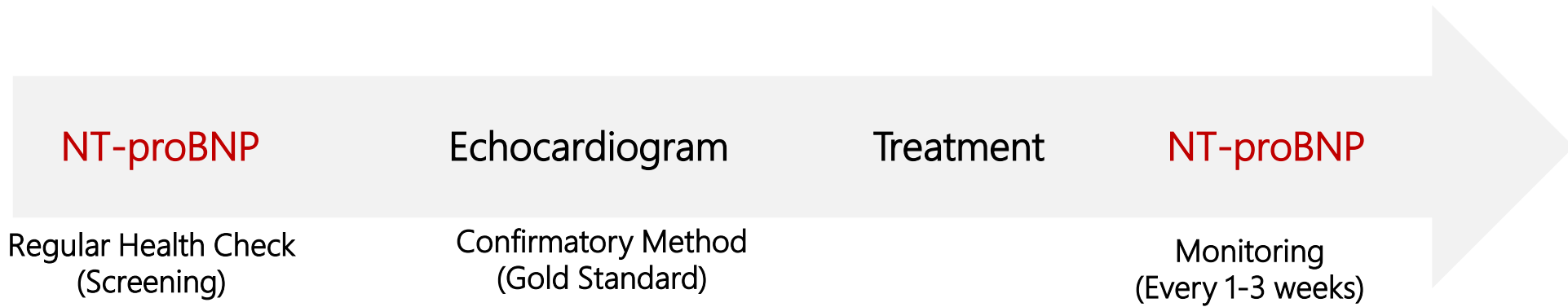
REFERENCE RANGE

< 0.1 ng/mL	Normal Range
0.1 - 0.2 ng/mL	Suspected
> 0.2 ng/mL	Abnormal

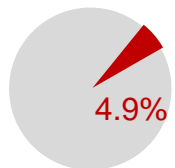
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Sales & Marketing Point_Vcheck cardiac marker

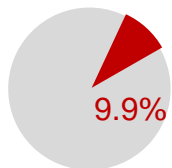
01 Clinical Application of NT-proBNP



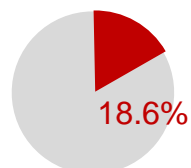
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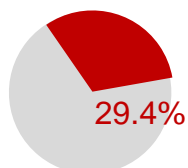
Juvenile (6-12m)



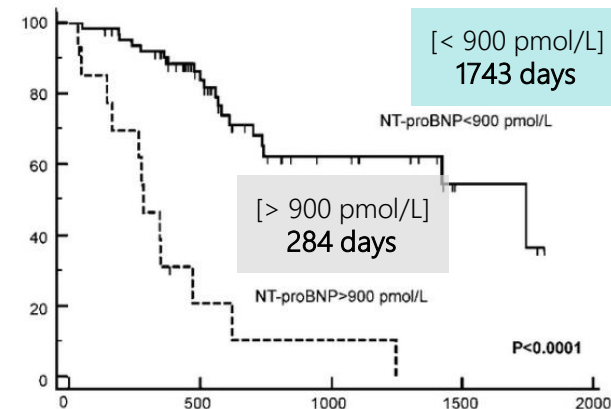
Young (1-3 years)



Adult (3-9 years)



Senior (≥9 years)



⇒ With low NT-proBNP survival is much longer

Sales & Marketing Point_Vcheck cardiac marker

03 Evaluation Paper 2022.March - Veterinary Clinical Pathology (USA)

Veterinary Clinical Pathology

An International Journal of Laboratory Medicine

TECHNICAL REPORT | Open Access | CC BY

Analytical validation of a novel point-of-care immunoassay for canine N-terminal pro-brain natriuretic peptide analysis

Kendal E. Harr ✉ Sonya G. Gordon, Ryan D. Baumwart, Ross Feldgreber, Matthew R. Spiro

First published: 20 March 2022 | <https://doi.org/10.1111/vcp.13101>

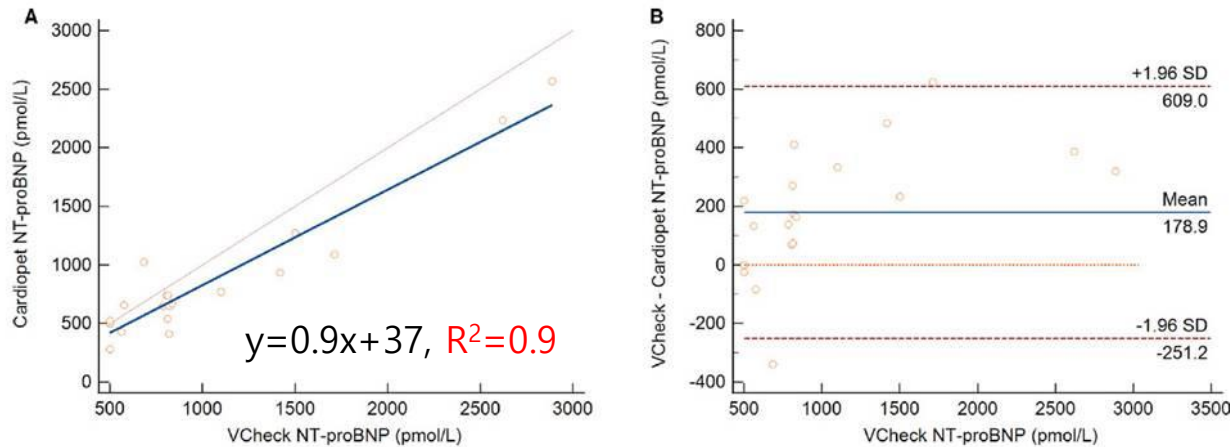


Figure 2. Comparison of the Vcheck and Cardiopet NT-proBNP assays (Direct instrument-to-instrument comparisons)

TABLE 1 Precision of the Vcheck NT-proBNP assay across concentrations

Target concentration(pmol/L)	Coefficient of variation(%)
600	20
1900	12
4000	9

Abbreviation: NT-proBNP, N-terminal pro-brain natriuretic peptide.

Table 1. Precision of the Vcheck NT-proBNP assay across concentrations

Thank you.

Any Questions?

BIONOTE OVERSEAS SALES DEPARTMENT

07.2022

