

Quantitative marker of myocardial injury, Troponin I

Vcheck Feline Tnl

BIONOTE Marketing team

DEC 2021

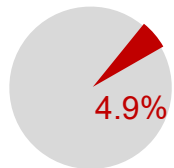


Feline Heart Disease: HCM

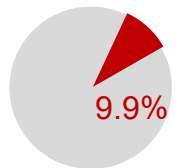
Hypertrophic Cardiomyopathy (HCM)

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

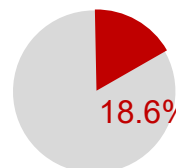
- **Prevalence**¹: 15% in the general cat population, up to 29% in older cats (In apparently healthy cats)



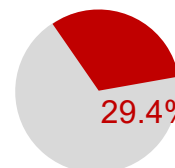
Juvenile (6-12m)



Young (1-3 years)

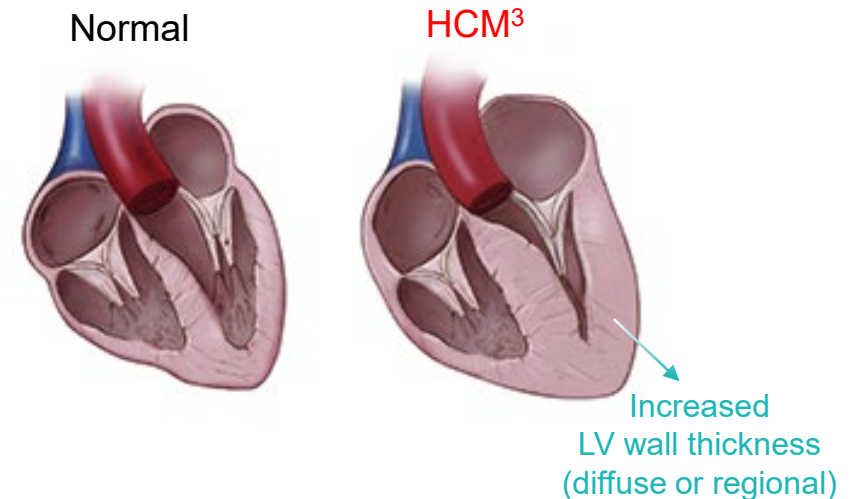


Adult (3-9 years)



Senior (≥9 years)

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



Feline Heart Disease: HCM

Hypertrophic Cardiomyopathy (HCM)

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- **Complications:**

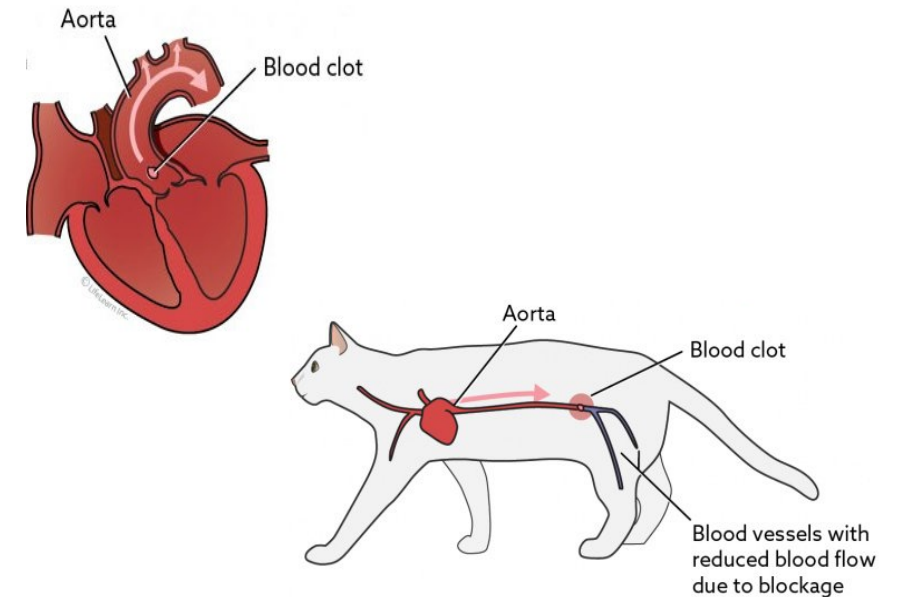
- ① **Congestive heart failure (CHF)** 28% of HCM cats²

- : The increase in pressure in the left atrium causes back pressure in the blood vessels of the lungs and a fluid build up in the lungs (tachypnea, labored breathing)

- ② **Arterial thromboembolism (ATE)** 12-21% of HCM cats³

- : The clot, which is formed in the left atrium, travels to an artery and becomes an ATE, which then blocks the blood flow, causing infarction. (paralysis, severe pain)

- **Mortality**⁴: 23% (cardiovascular death within 5 years)



Feline Heart Disease: HCM

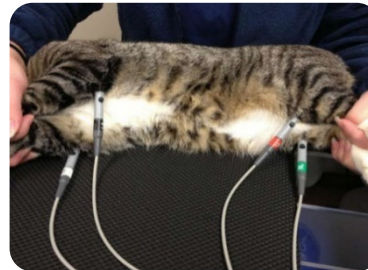
Diagnosis of HCM

- Auscultation



Not sensitive and specific
(up to 80% in HCM cats,
30-45% of healthy cats)

- ECG (Electrocardiogram)



Not recommended

- X-ray (Radiography)

CHF



Insensitive for mild or moderate HCM,
but the gold standard for the presence of CHF

- Echocardiography

HCM



Only a gold standard test for diagnosis of HCM,
but it is expensive (\$200~400),
needs trained operators

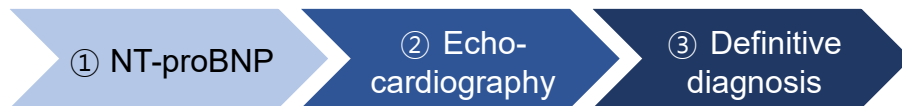
Feline Heart Disease: HCM

NT-proBNP: “ACVIM consensus statement guidelines”

- The measurement of NT-proBNP can be considered as an **initial screening test** for identifying advanced HCM.
- When X-ray or echocardiography are unavailable, evaluation of NT-proBNP concentrations should be considered.

In apparently healthy cats,

The measurement of NT-proBNP can be considered as an initial screening test.



≥ 100 pmol/L

: High possibility of HCM

< 100 pmol/L

: Normal results do not assure that a cat is free of HCM

In cats with respiratory signs,

Point-of-care NT-proBNP test should be considered (high level of evidence).



≥ 270 pmol/L

: CHF is more likely to be the cause

< 270 pmol/L

: Respiratory disease is more likely to be the cause

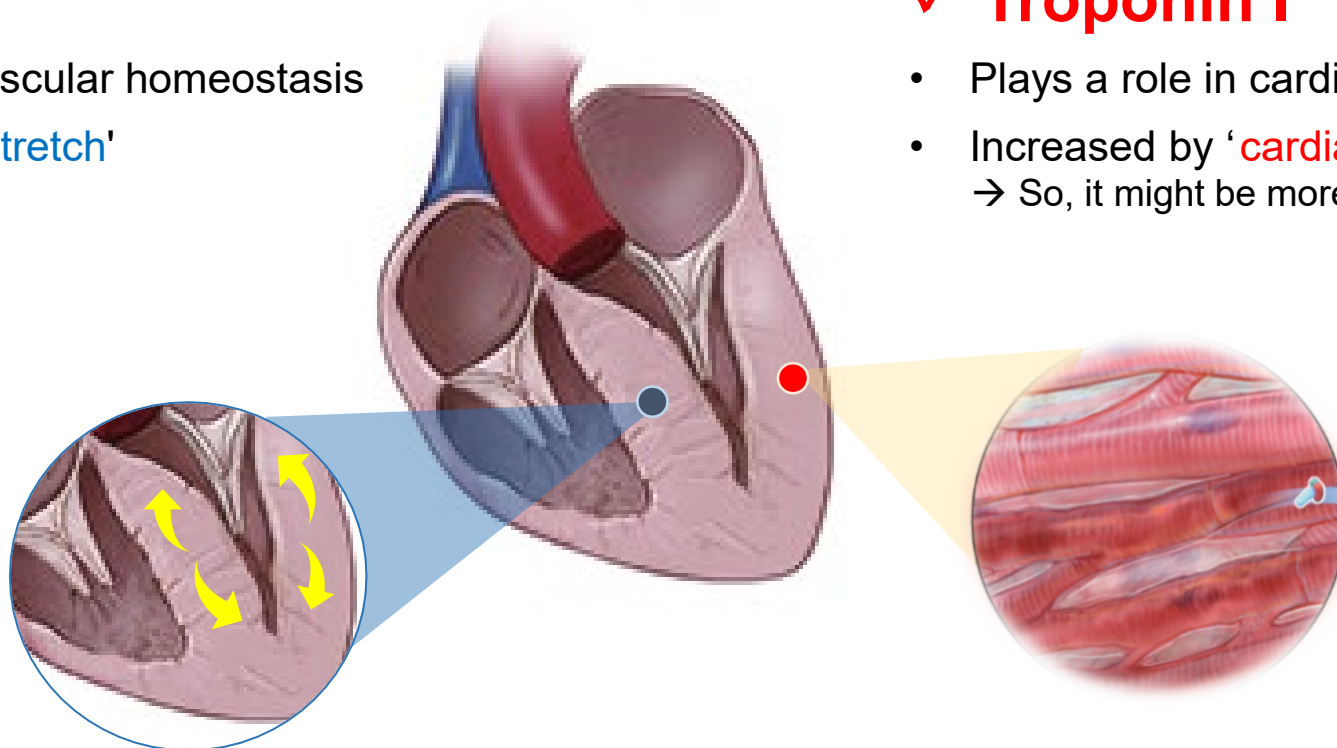


Cardiac Biomarkers

Two Useful Cardiac markers in Cats

✓ 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'
→ So, it might be more suitable in cats with HCM

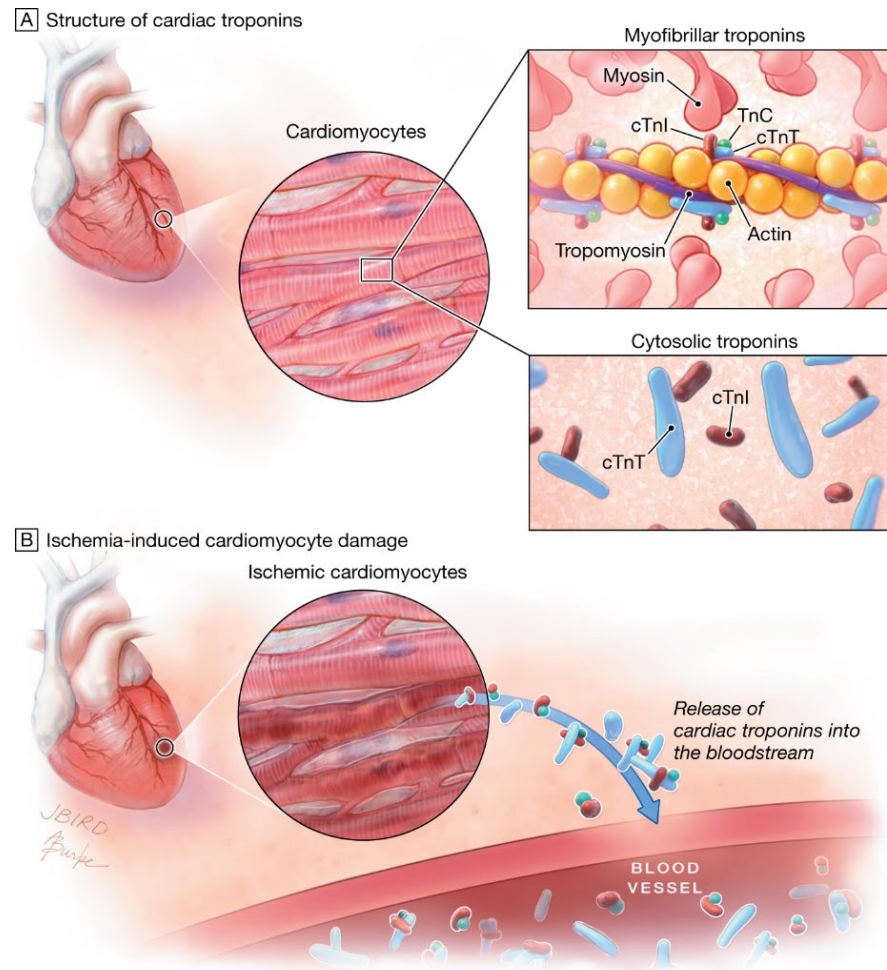
Cardiac Biomarkers

Two Useful Cardiac markers in Cats

Indication	NT-proBNP	Troponin I
Screens for HCM in apparently healthy cats	○ ^{1,2}	○ ^{7,8}
Discriminates between cardiac and non-cardiac causes of respiratory distress	○ ^{3,4}	△ ⁹
Evaluates increased risk of cardiovascular death	○ ⁵	○ ¹⁰
Differentiates grades of severity of HCM	○ ⁶	○ ⁸

Reference: 1. J Vet Cardiol. 2014; 16:245-255. 2. J Vet Intern Med. 2017;31:994-999. 3. J Vet Cardiol. 2009;11(Suppl 1):S51-S61. 4. J Vet Intern Med. 2012;26:542-546. 5. J Vet Intern Med 2017;31:678–684. 6. Vet Clin Pathol. 2011 Jun;40(2):237-44. 7. J Vet Intern Med. 2018;32:922-929. 8. J Vet Intern Med. 2019;33:1242-1250. 9. J Am Vet Med Assoc. 2008;233:1261-1264. 10. J Vet Intern Med. 2014;28:1731-1737.

Troponin I



- ✓ After cardiac insult, a rise of **Troponins** can be seen within 2-3 hours, and peak concentration is frequently reached in 18-24 hours.
- ✓ In human medicine, Troponin I (TnI) is used for the diagnosis of acute myocardial infarction (AMI).

In cats,

- ✓ TnI is useful for assessing hypertrophic cardiomyopathy (HCM), which is the most common heart disease.
- ✓ Increased TnI concentrations reflect the severity of HCM.

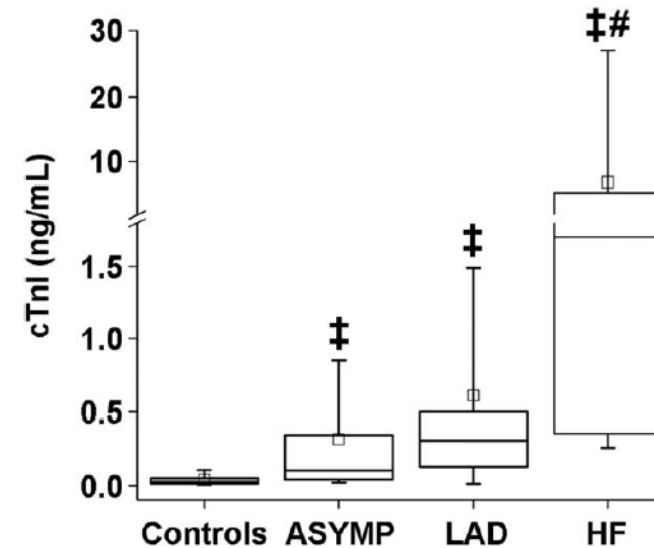
Troponin I

1) Screening for HCM in apparently healthy cats



“Troponin I might be considered for differentiating between normal cats and cats with subclinical HCM when cardiac disease is suspected”¹ (Level of evidence: medium)

- Troponin I reflects **myocardial damage** as a consequence of developing HCM.
- If other causes of cardiac injury have been ruled out, measuring TnI provides additional information that is useful for assessing the severity of HCM.
 - **TnI < 0.163 ng/ml** : Likely excludes HCM
 - **TnI > 0.234 ng/ml** : Likely identifies severe HCM



ASYMP: asymptomatic HCM without LA dilatation, LAD: asymptomatic HCM with LA dilatation, HF: cats with heart failure

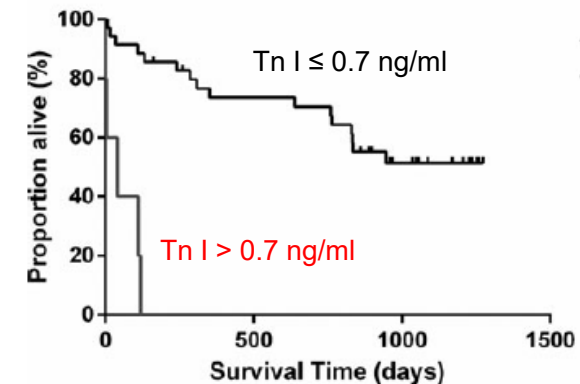
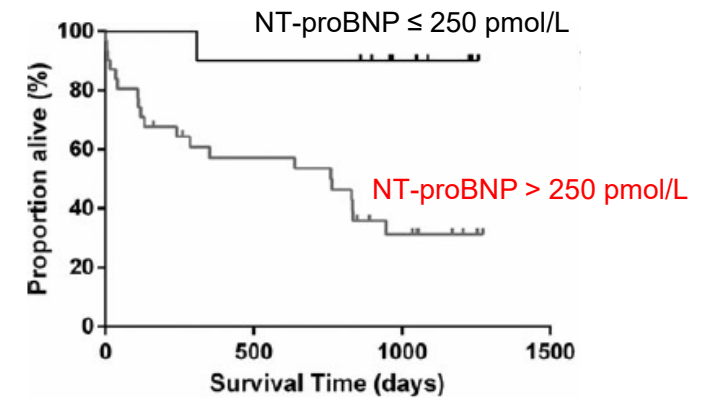
Troponin I

2) Predictor of cardiac death in cats with HCM



“An increased TnI concentration is associated with increased risk of cardiovascular death”¹ (Level of evidence: high)

- **Poor prognosis of HCM cats:** CHF, ATE, increased LA size ...
- (In humans) a single measurement of NT-proBNP, TnI, or a combination of both, act as independent predictors of adverse cardiovascular events.
- **Predictors of cardiac death in cats with HCM**
 - **NT-proBNP:** cut-off 250 pmol/L → Hazard ratio 10
 - **Troponin I:** cut-off 0.7 ng/ml → Hazard ratio 5 (independent of the presence of CHF or LA dilatation)

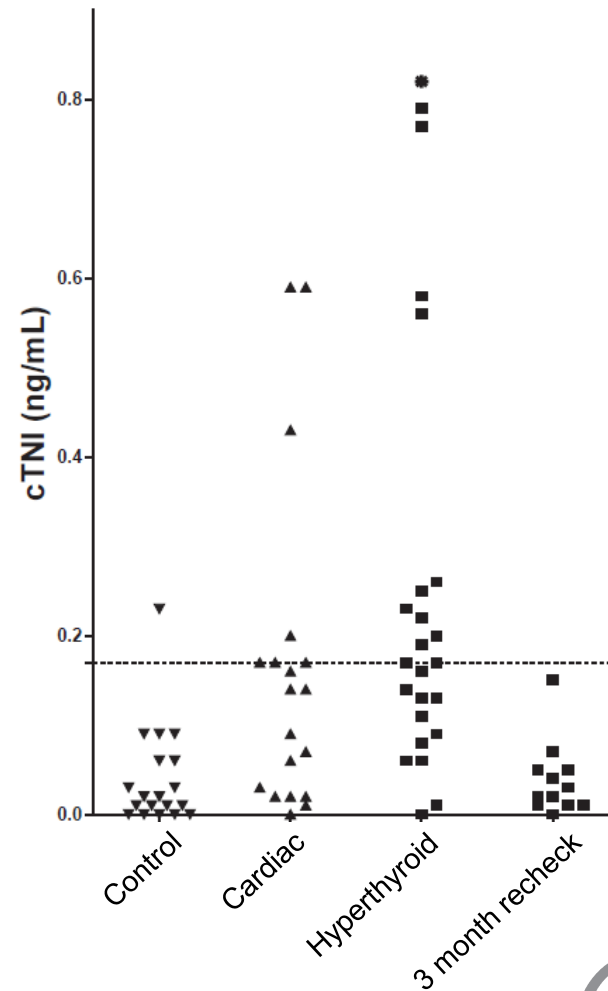


Conditions affecting Tnl concentrations

Troponin I measurement detects only myocardial injury.

Non-cardiac disease also might cause **secondary myocardial injury**.

- **Hyperthyroidism¹** (In old cats)
- **Renal disease²**
- **Respiratory disease³**
- **Anemia⁴**
- **Neoplasia⁵**



Product Introduction

Vcheck Feline Tnl

Product Introduction

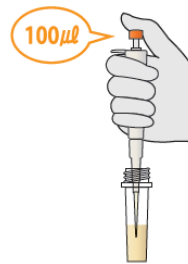
Vcheck Feline Tnl

Quantitative marker of myocardial injury



- **Sample:** Serum 100 μ l
- **Testing Time:** 10 minutes
- **Measurement :** Quantitative
- **Measurement Range:** 0.01 – 20 ng/ml
- **Storage Condition:** 1 - 30 °C

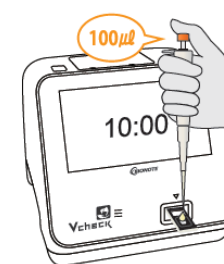
1 Add 100 μ l of the sample to the assay diluent tube



2 Mix well 5-6 times by using a 100 μ l pipette



3 Add 100 μ l of the mixed sample into the test device



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.)

< 0.03 ng/ml	0.03 ~ 0.12 ng/ml	> 0.12 ng/ml
Normal	Suspected Possibility of myocardial injury	Abnormal High possibility of myocardial injury

* Tnl concentrations should not be used to either confirm or exclude primary cardiac disease without the simultaneous use of echocardiography.

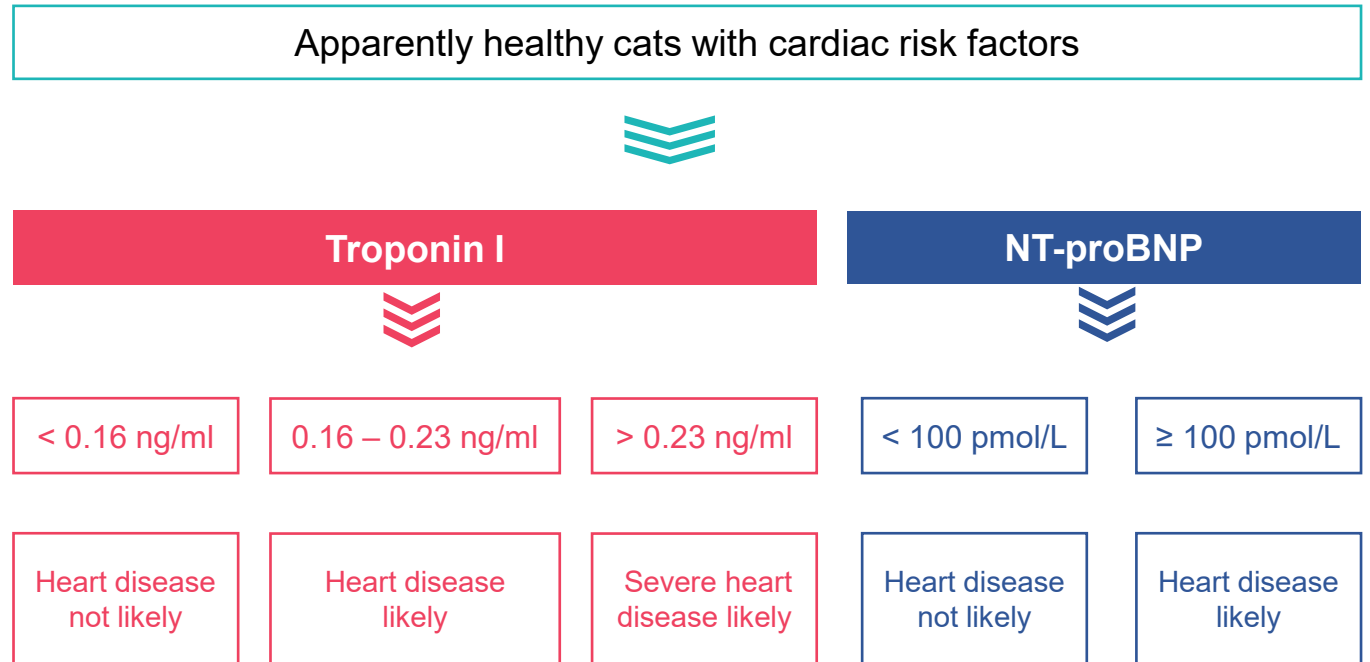
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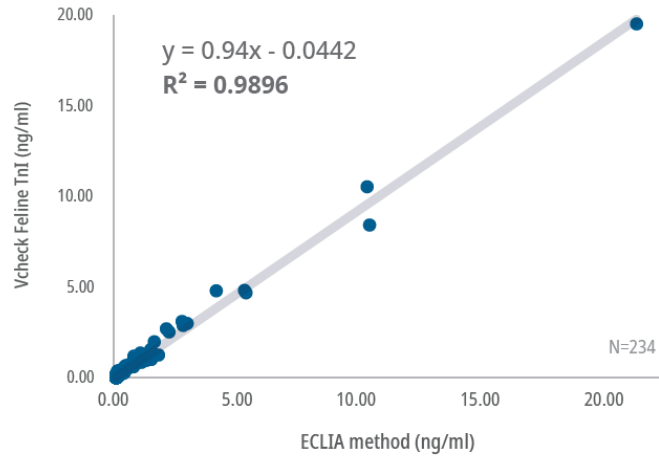


Vcheck Feline TnI Performance

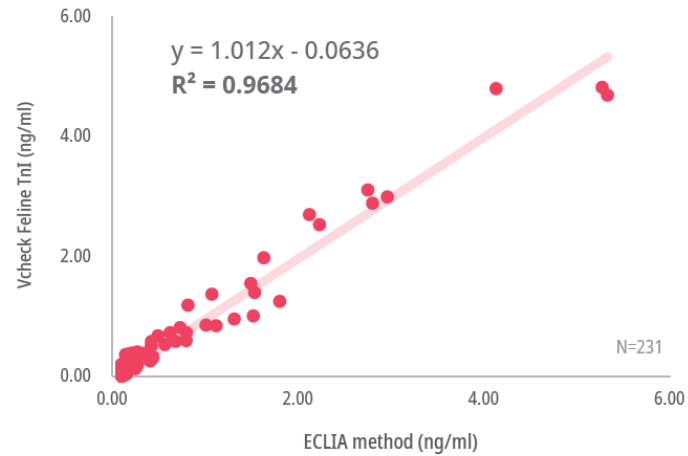
Correlation

Vcheck Feline TnI has a **strong correlation** ($y=0.94x-0.0442$, $R^2=0.9896$ in entire concentration; $y=1.012x-0.0636$, $R^2=0.9684$ in low concentration) with the ECLIA method from 'R' multinational healthcare company.

Entire concentration (0~20 ng/ml)



Low concentration (0~6 ng/ml)



Comparative analysis of TnI	Roche (ng/ml)		Total	
	> 0.12	≤ 0.12		
Vcheck (ng/ml)	> 0.12	46	8	54
	≤ 0.12	5	175	180
Total	51	183	234	

- **Sensitivity 90.2%** (46/51)
- **Specificity 95.6%** (175/183)
- **Accuracy 94.4%** (221/234)

*Internal Evaluation Data

Performance

Precision

In the repeatability tests (within run, between run, between tester, between day and between lot), all test results were confirmed to meet the acceptance criteria.

Concentration	Criteria
Level 1 (Low)	SD \leq 0.3 ng/ml
Level 2 (Medium)	CV \leq 15%
Level 3 (High)	CV \leq 15%

Cross-reactivity

There was no cross-reactivity with skeletal muscle troponin I, cardiac troponin T and troponin C (200 ng/ml, respectively).

Interference

No interference was observed for each substance up to the concentration presented in the following table.

Interfering substances	Concentration
Hemoglobin	< 150 mg/dL
Intralipid	< 2,500 mg/dL
Cholesterol	< 250 mg/dL
Bilirubin	< 20 mg/dL
Vitamin C	< 100 mg/dL

* Moderate or Severe hemolysis can falsely increase Tnl levels.

Q&A Session

BIONOTE Marketing team

DEC 2021

