NIBRA - CS®

Name	: [redacted]	**Doctor Name**	: [redacted]
Age	: [redacted]	**Performed at**	: 03-Jul-2026 17:06:47 (GMT+5:30)
Sex	: Male		

Report on Cardiac Autonomic Neuropathy Testing

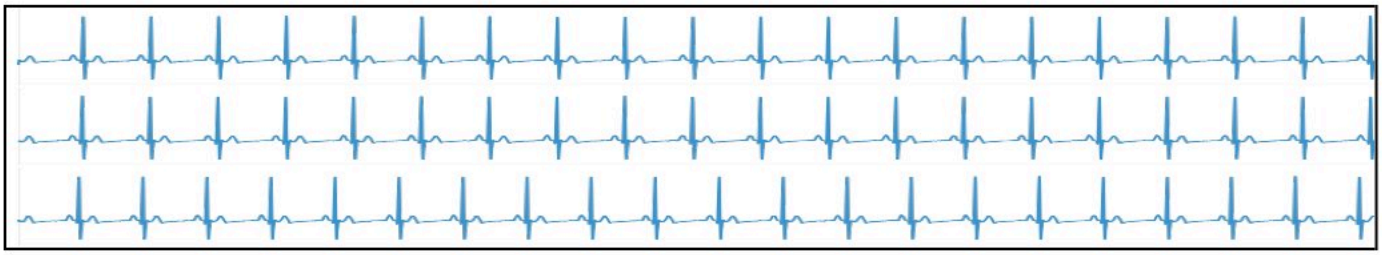
1. Resting

Mean HR = 59.69 BPM

2. Deep Breathing

Exhale HR = 58.83 BPM

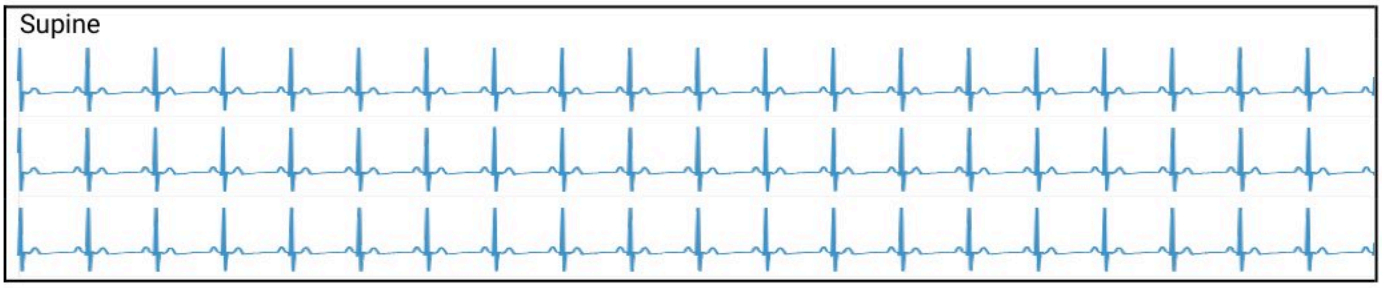
Inhale HR = 60 BPM



3. Response to Standing

R-R @ 30th beat = 1013ms

R-R @ 15th beat = 990ms

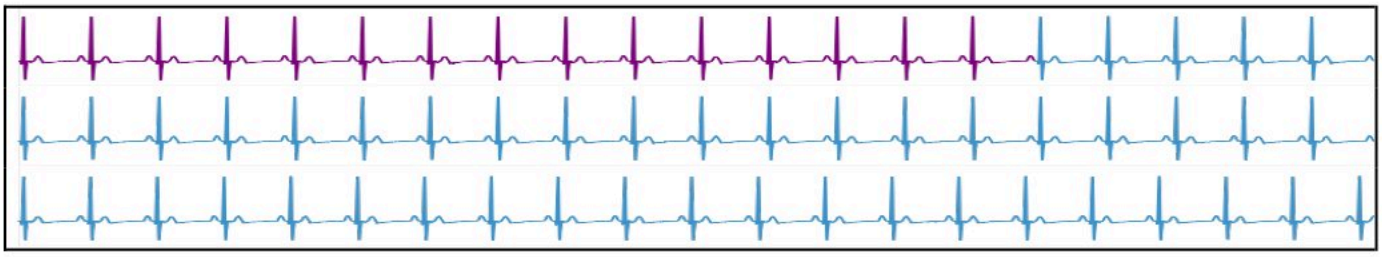


4. Valsalva Maneuver

— Valsalva Hold (15 secs)

Shortest R-R = 989ms

Longest R-R = 1014ms



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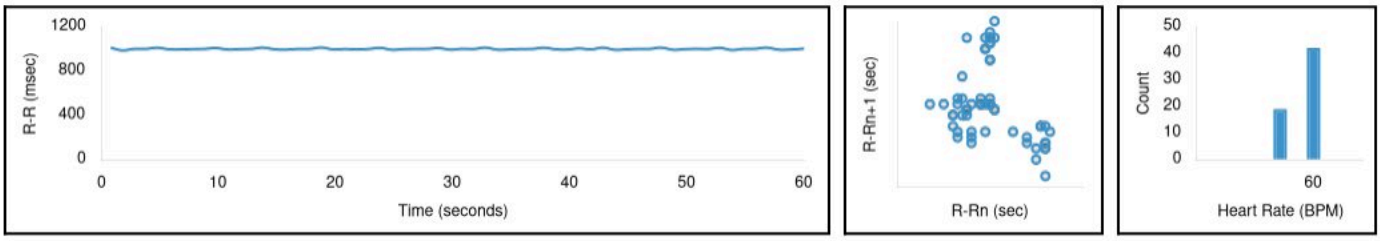
Sex	: Male		

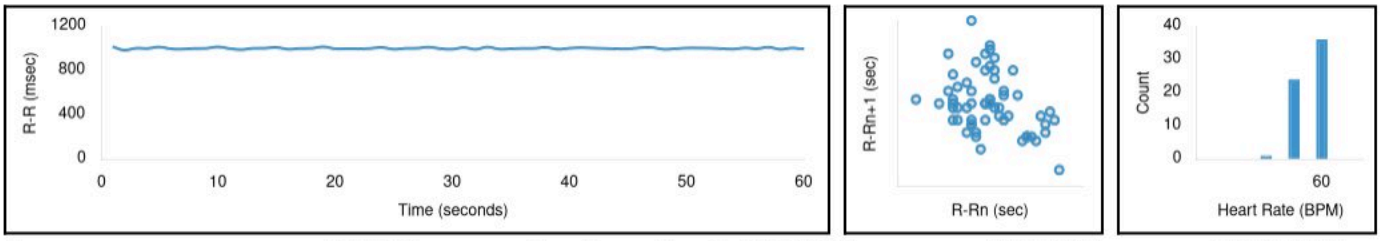
PARASYMPATHETIC FUNCTION

CARDIOTACHOGRAM	DISTRIBUTIONS

1. Resting



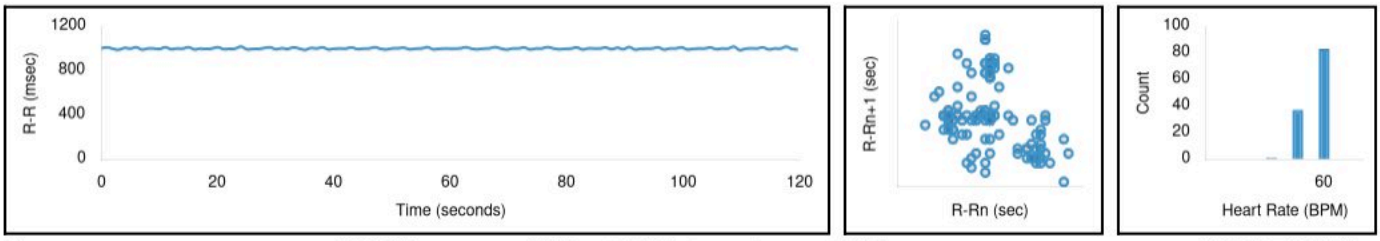
2. Deep Breathing



Mean	: 1000.3ms	**Avg. Deep Breath Diff (DBD)**	: 1.17 BPM	ABNORMAL
Standard Deviation	: 7.24ms	Resp Sinus Arrhythmia (RSA) Index	: 0.02	
Co-efficient of Variation	: 0.72	Expiration-Inspiration Ratio (E:I)	: 1.02	

Normal : > 15
Borderline : 10 to 15
Abnormal : < 10

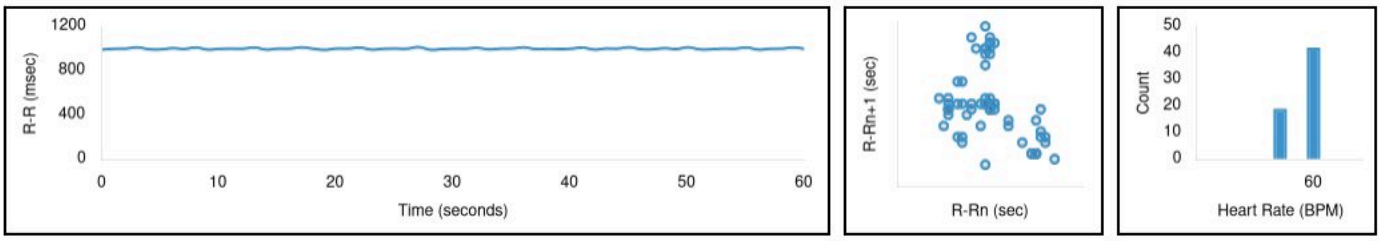
3. Response to Standing



Mean	: 999.98ms	30 Beat R-R Interval	: 1013ms	BORDERLINE
Standard Deviation	: 6.89ms	15 Beat R-R Interval	: 990ms	
Co-efficient of Variation	: 0.69	**30:15 Ratio**	: 1.02	

Normal : > 1.04
Borderline : 1 to 1.04
Abnormal : < 1

4. Valsalva Maneuver



Mean	: 999.87ms	Max R-R Interval	: 1014ms	ABNORMAL
Standard Deviation	: 6.58ms	Min R-R Interval	: 989ms	
Co-efficient of Variation	: 0.66	**Valsalva Ratio**	: 1.03	

Normal : > 1.2
Abnormal : ≤ 1.2

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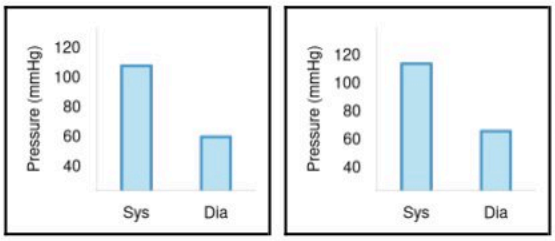
Sex	: Male		

SYMPATHETIC FUNCTION

1. Postural Hypotension

BP Supine	: 110 / 62 mmHg
BP Standing Immediate	: 108 / 66 mmHg
BP After 180 seconds	: 116 / 68 mmHg
Fall in Systolic	: -6 mmHg

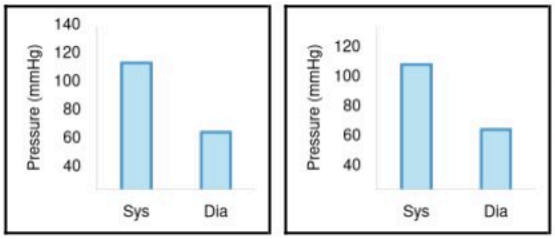


NORMAL

Normal : < 10
Borderline : 10 to 30
Abnormal : > 30

2. Sustained Handgrip

BP Before Handgrip	: 115 / 66 mmHg
BP After Handgrip	: 110 / 69 mmHg
Increase in Diastolic	: 3 mmHg



ABNORMAL

Normal : > 16
Borderline : 10 to 16
Abnormal : < 10

Summary

Two or more prominent Parasympathetic Dysfunction was observed.
One prominent Sympathetic Dysfunction was observed.
Definite Cardiac Autonomic Dysfunction was observed.

Doctor's Comments

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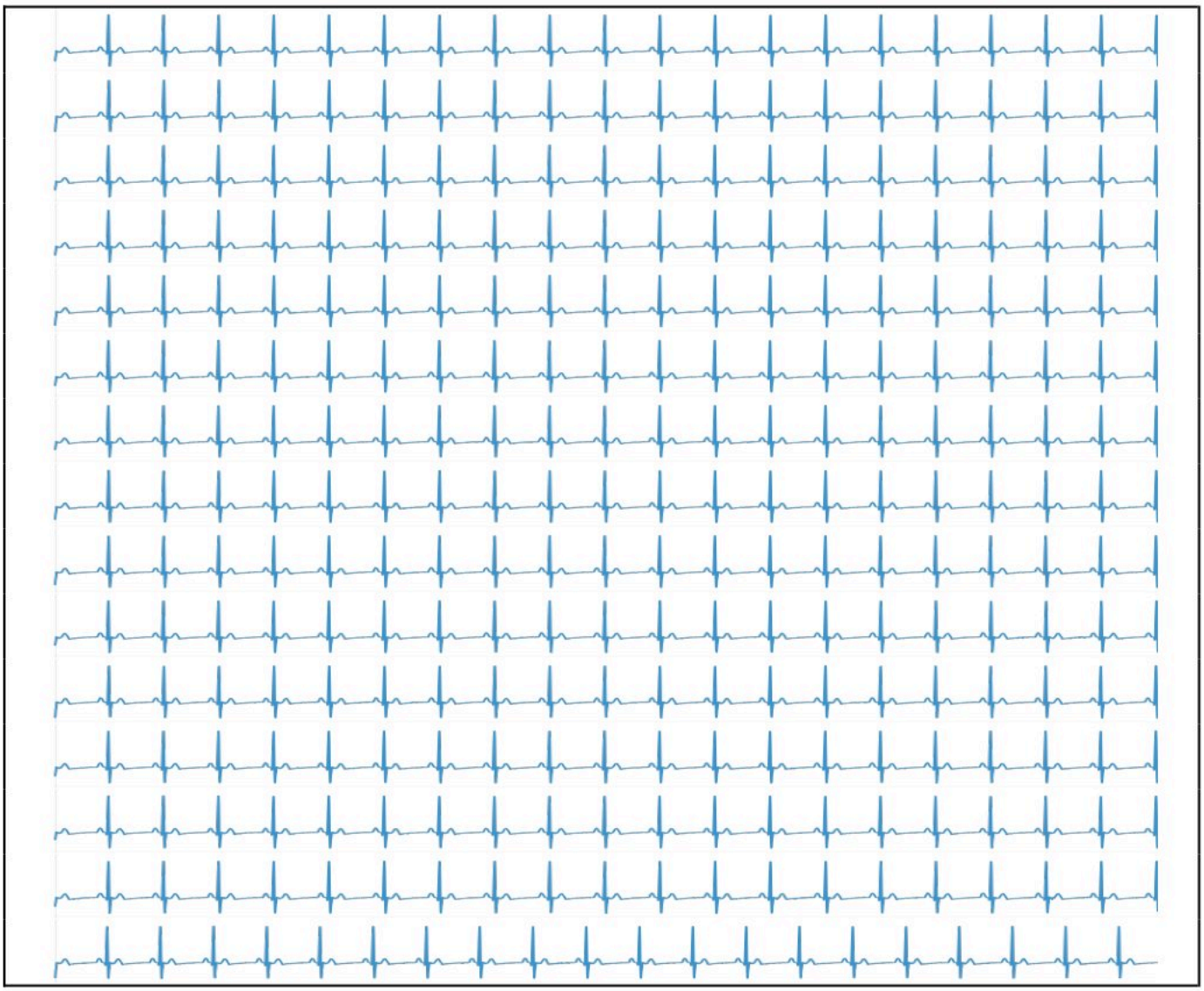
Sex	: Male		

HEART RATE VARIABILITY

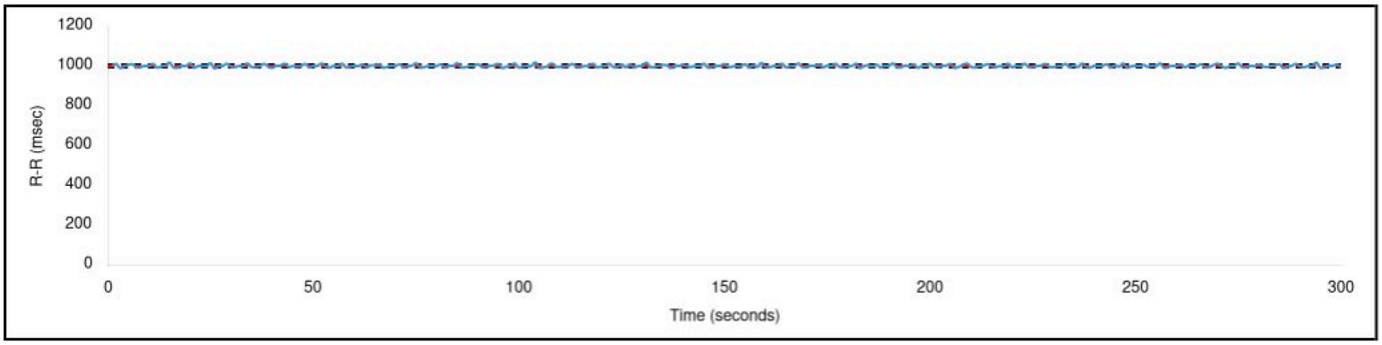
1. ECG Acquisition

Duration = 5 mins



2. RR Interval Tachogram

Mean (999.97 ms) +1 SD (1006.55 ms) -1 SD (993.40 ms)



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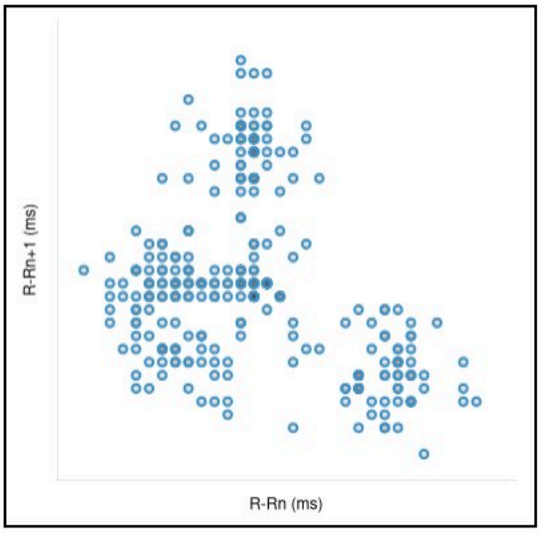
Sex	: Male		

3. Time Domain Analysis

Variable	Value		Status	Reference
Mean R-R	999.97	(ms)	NORMAL	*Normal : 850 to 1200* *Borderline : 700 to < 850* *Abnormal : < 700*
STD RR (SDNN)	6.57	(ms)	ABNORMAL	*Normal : ≥ 35* *Borderline : 20 to < 35* *Abnormal : < 20*
Mean HR	59.65	(bpm)	NORMAL	*Normal : 50 to 70* *Borderline : > 70 to 85* *Abnormal : > 85*
STD HR	0.48	(bpm)	NORMAL	*Normal : ≤ 5* *Borderline : 5 to 8* *Abnormal : > 8*
RMSSD	10.60	(ms)	ABNORMAL	*Normal : ≥ 30* *Borderline : 15 to < 30* *Abnormal : < 15*
NN50	0.00	(count)	ABNORMAL	*Normal : ≥ 20* *Borderline : 5 to < 20* *Abnormal : < 5*
pNN50	0.00	(%)	ABNORMAL	*Normal : ≥ 5* *Borderline : 1 to < 5* *Abnormal : < 1*

4. Poincare Plot



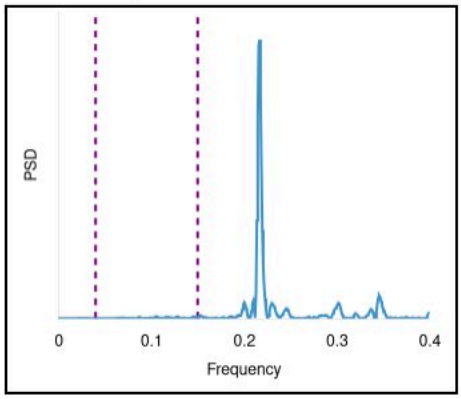
Variable	Value		Status	Physiological Meaning
SD1	7.50	(ms)	Severe Depletion	Profound autoneurological exhaustion.
SD2	5.50	(ms)	Critical Deconditioning	Profound physiological immobilization.
SD1/SD2	1.36		Low-Power White Noise	System is random due to signal exhaustion.

5. Frequency Domain Analysis

Variable	Value		Ln	Status	Reference
Total Power	24.52	(ms²)	3.1995	ABNORMAL	*Normal : ≥ 2000* *Borderline : 1000 to < 2000* *Abnormal : < 1000*
VLF	0.02	(ms²)	-3.7452	ABNORMAL	*Normal : ≥ 150* *Borderline : 50 to < 150* *Abnormal : < 50*
LF	0.64	(ms²)	-0.4491	ABNORMAL	*Normal : ≥ 700* *Borderline : 300 to < 700* *Abnormal : < 300*
HF	23.86	(ms²)	3.1721	ABNORMAL	*Normal : ≥ 600* *Borderline : 200 to < 600* *Abnormal : < 200*
LF norm	2.61	(%)		ABNORMAL	*Normal : 40 to 60* *Borderline : 20 to < 40* *> 60 to 80* *Abnormal : < 20 or > 80*
HF norm	97.39	(%)		Out of bounds‡	*Normal : 40 to 60* *Borderline : 20 to < 40* *Abnormal : < 20*
LF/HF	0.03		-3.6212	ABNORMAL	*Normal : 0.5 to 2.0* *Borderline : > 2.0 to 3.0* *Abnormal : < 0.5 or > 3.0*

‡Predominant parasymp. mod. High vagal dominance.

6. FFT Spectrum



LF/HF Ratio in short-term recordings should be interpreted cautiously and not as an isolated measure of sympathovagal balance.

Interpret alongside clinical findings and cardiovascular autonomic reflex tests (CARTs). Reference ranges adapted from contemporary CAN-HRV literature.

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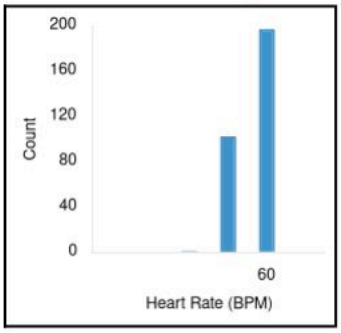
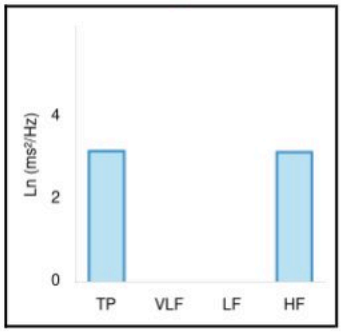
7. Autonomic Balance Analysis

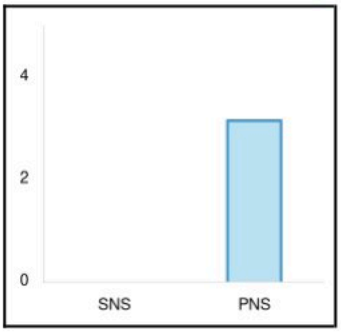
Heart Rate Histogram



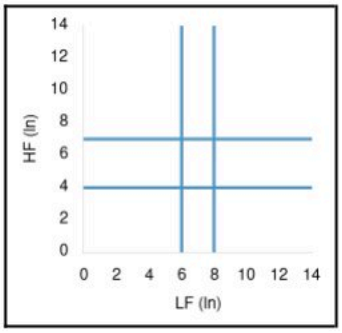
HRV Components



Autonomic Branch Activity



Autonomic Balance Plot



CAN + HRV GRADING SUMMARY

CART Diagnosis	Definite CAN *Two or more prominent Cardiac Autonomic Dysfunction was observed.*
HRV Status	Marked HRV reduction *Three or more prominent HRV Dysfunction was observed.*
Final Interpretation	**Definite CAN with advanced autonomic dysfunction**

Doctor's Comments

Reference Framework

Reference-informed structured CAN + HRV assessment framework derived from Ewing/Toronto criteria and HRV literature.

1. *Felício JS, Araújo MAM, de Lemos GN, Fernandes IJ, Ruivo LO, Chambouleyron EG, et al. Heart rate variability tests for diagnosing cardiovascular autonomic neuropathy in patients with type 2 diabetes mellitus in advanced stages of kidney disease. Cardiovasc Diabetol. 2025;24:144. doi:10.1186/s12933-025-02666-z.*
2. *Metelka R, Cibičková L, Gajdová J, Krystyník O. Heart rate variability evaluation in the assessment of cardiac autonomic neuropathy in patients with type 2 diabetes. Cor Vasa. 2018;60(4):e335-e344. doi:10.1016/j.crvasa.2017.05.001.*
3. *Oliveira DPSC, Souza CAQS, Facchin AC, Mariano BC, Silva LP, Peçanha T. Diagnostic value of heart rate-based methods for assessing cardiac autonomic neuropathy in prediabetes and diabetes. Physiol Rep. 2025;13:e70610. doi:10.14814/phy2.70610.*
4. *Ferdousi S, Gyeltshen P. Type 2 diabetes mellitus: cardiovascular autonomic neuropathy and heart rate variability. In: Type 2 Diabetes - From Pathophysiology to Cyber Systems. IntechOpen; 2016. doi:10.5772/intechopen.95515.*
5. *Pop-Busui R, Backlund JYC, Bebu I, Braffett BH, Lorenzi G, White NH, et al. Utility of using electrocardiogram measures of heart rate variability as a measure of cardiovascular autonomic neuropathy in type 1 diabetes patients. J Diabetes Investig. 2022;13(1):125-133. doi:10.1111/jdi.13635.*
6. *Hoshi RA, Pastre CM, Vanderlei LCM, Godoy MF. Poincaré plot indexes of heart rate variability: relationships with other nonlinear variables. Auton Neurosci. 2013;177(2-3):271-274. doi:10.1016/j.autneu.2013.05.004.*

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