Acute change of cardiac autonomic regulations after thermal and non-thermal pulmonary vein ablation

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Introduction

- Pulmonary vein isolation (PVI) by thermal energy (radiofrequency energy or cryoenergy) results in collateral ganglionic plexi ablation. On the contrary, pulsed electric field (PEF) energy presumably spares neural tissue.

- We investigated and compared the effect of PVI on parasympathetic input into the sinus node (SAN) and AV node (AVN) when four different ablation strategies were used.

JACC: Clinical Electrophysiology
Volume 8, Issue 7, July 2022, Pages 895-904

Original Research

Atrial Fibrillation - Catheter Ablation

Autonomic Changes Are More Durable After Radiofrequency Than Pulsed Electric Field Pulmonary Vein Ablation

Predrag Stojadinović MD [a], Dan Wichterle MD, PhD [a], Petr Peichl MD, PhD [a], Hiroshi Nakagawa MD, PhD [b], Robert Čihák MD, PhD [a], Jana Hašková MD [a], Josef Kautzner MD, PhD [a]

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For Better or Worse, Pulse Field Ablation Is Kinder to Some Nerves*

JACC: Clinical Electrophysiology, Volume 8, Issue 7, July 2022, Pages 905-907

Min-young Kim, Stavros Stavrakis

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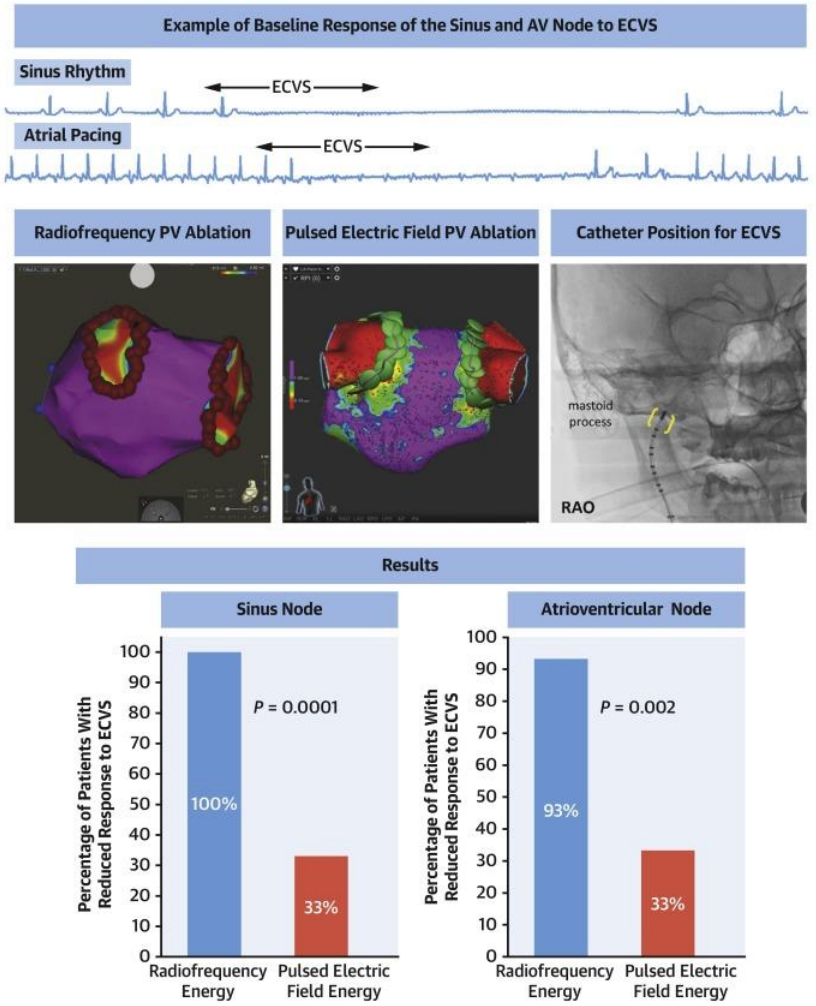
CENTRAL ILLUSTRATION: Acute Change of Responsiveness of Sinoatrial Node and AV Node to ECVS After PV Isolation



Stojadinović P, et al. J Am Coll Cardiol EP. 2022;8(7):895-904.

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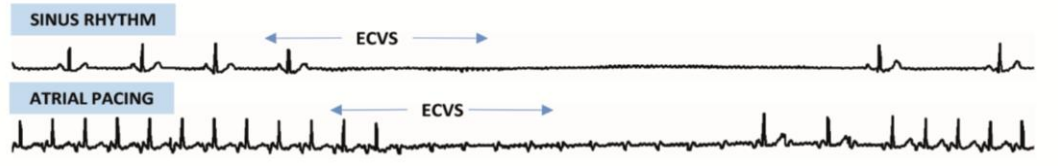
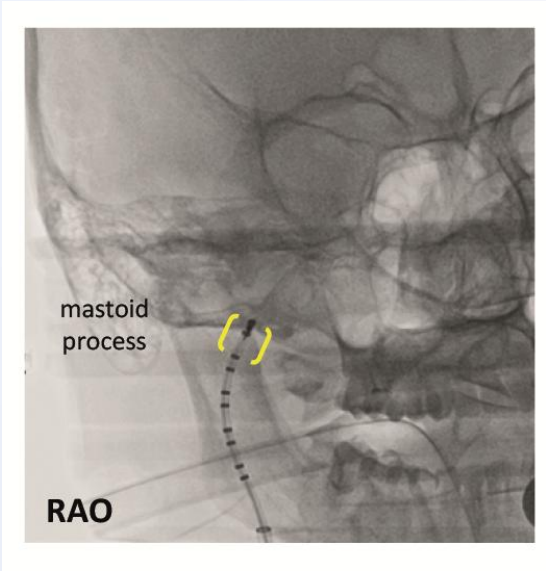
Methods

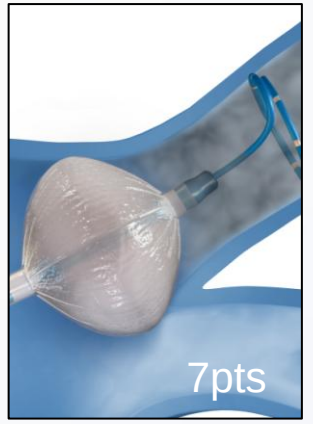
Example of baseline response to ECVS



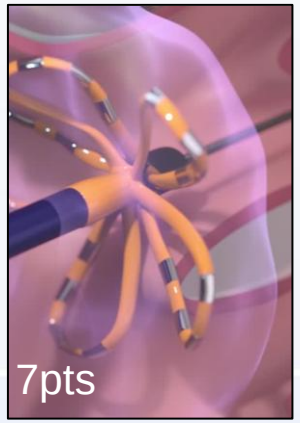


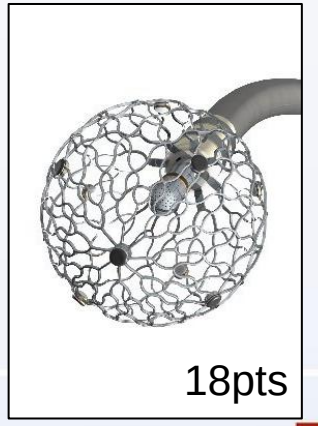
Neurostimulator used for ECVS

Thermal energy sources

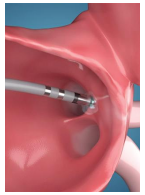


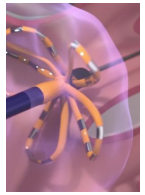
Non-thermal energy sources





Baseline characteristics



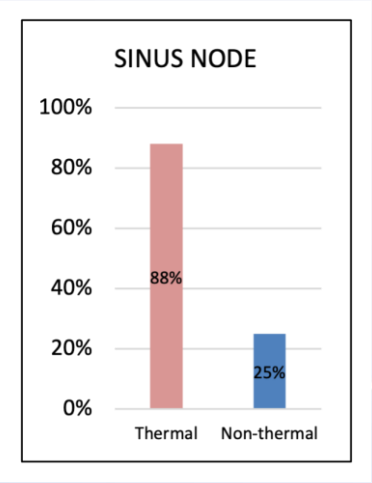


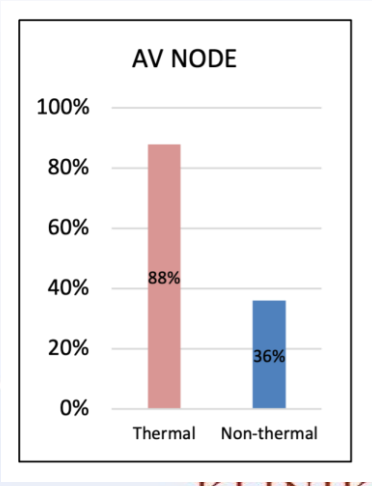

	Radiofrequency	Cryoenergy	PEF Farapulse	PEF Affera
	N=17	N=7	N=7	N=18
Male	10 (59%)	4 (57%)	6 (86%)	15 (83%)
Age (years)	55±15	56±15	61±15	59±10
Arterial Hypertension	11 (65%)	5 (71%)	6 (86%)	11 (61%)
Diabetes Mellitus	1 (6%)	0 (0%)	1 (14%)	2 (11%)
Coronary Artery Disease	1 (6%)	0 (0%)	0 (0%)	3 (17%)
TIA or Stroke	0 (0%)	0 (0%)	0 (0%)	2 (11%)
Body Mass Index (kg/m2)	27±4	32±4	29±4	31±5
Left Ventricular Ejection Fraction (%)	59±1	58±1	59±1	55±5
Left Atrial Volume Index (ml/m2)	35±9	38±15	36±11	39±9
AF duration (months)	41±59	46±37	35±27	28±23
Beta blocker	12 (71%)	7 (100%)	6 (86%)	15 (83%)
Antiarhythmic drugs	8 (47%)	3 (43%)	3 (43%)	14 (78%)

Results 1

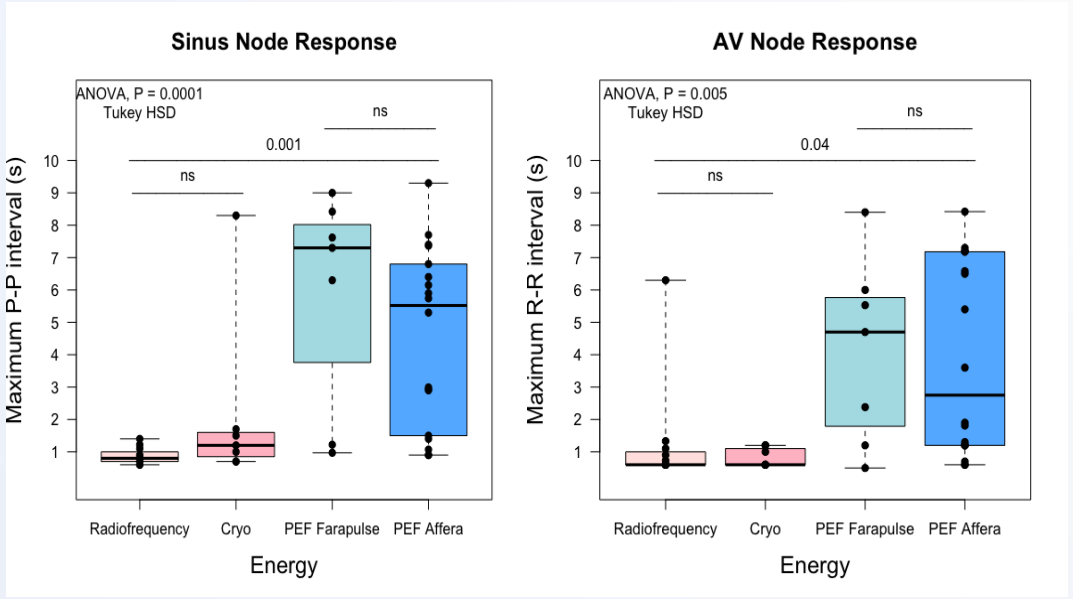
	Thermal Energy			Nonthermal Energy			
	Before	After	Delta	Before	After	Delta	P value
Heart Rate (bpm)	54±8	70±15	16±11	49±8	58±15	9±11	0.049
SNRT (ms)	1361±253	1213±321	-149±329	1740±571	1526±472	-203±516	0.33
Wenckebach point (bpm)	148±28	152±23	5±17	135±28	138±25	3±18	0.34

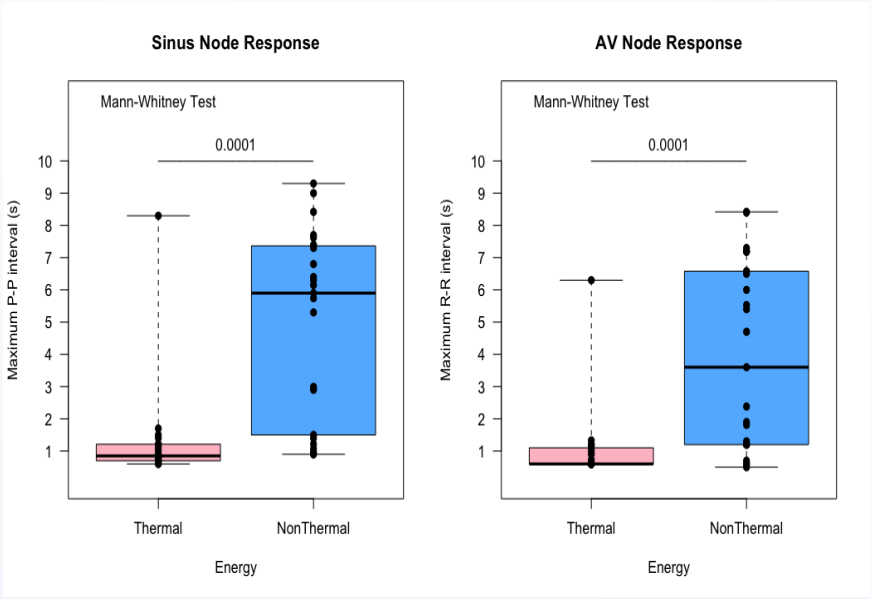
Percentage of patients with reduced response to ECVS





Results 2


Sinus Node Response
ANOVA, P = 0.0001
Tukey HSD
ns
0.001
ns
Maximum P-P interval (s)
Radiofrequency
Cryo
PEF Farapulse
PEF Affera
Energy
AV Node Response
ANOVA, P = 0.005
Tukey HSD
ns
0.04
ns
Maximum R-R interval (s)
Radiofrequency
Cryo
PEF Farapulse
PEF Affera
Energy


Sinus Node Response
Mann-Whitney Test
0.0001
Maximum P-P interval (s)
Thermal
NonThermal
Energy
AV Node Response
Mann-Whitney Test
0.0001
Maximum R-R interval (s)
Thermal
NonThermal
Energy

Conclusion

- Vagal responses of SAN and AVN are preserved in most AF patients after non-thermal PVI.
- This contrasts with the much stronger effect of thermal PVI.
- Whether this may influence the clinical outcome of AF ablation procedures remains to be investigated in future studies.

THANK YOU!

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