Πότε να καταλύονται οι έκτακτες κοιλιακές συστολές

Νικόλαος Φραγκάκης

Επίκουρος Καθηγητής Καρδιολογίας ΑΠΘ
Γ΄ Πανεπιστημιακή Καρδιολογική Κλινική
Γ.Ν. Ιπποκράτειο, Θεσσαλονίκης

PVCs: When to ablate?

Critical Questions that should be answered

- Are they symptomatic?
- Prognostic significance of frequent PVCs
- Does PVCs induced cardiomyopathy exist?
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- Is ablation an effective therapy?
- Which group of patients will benefit most?

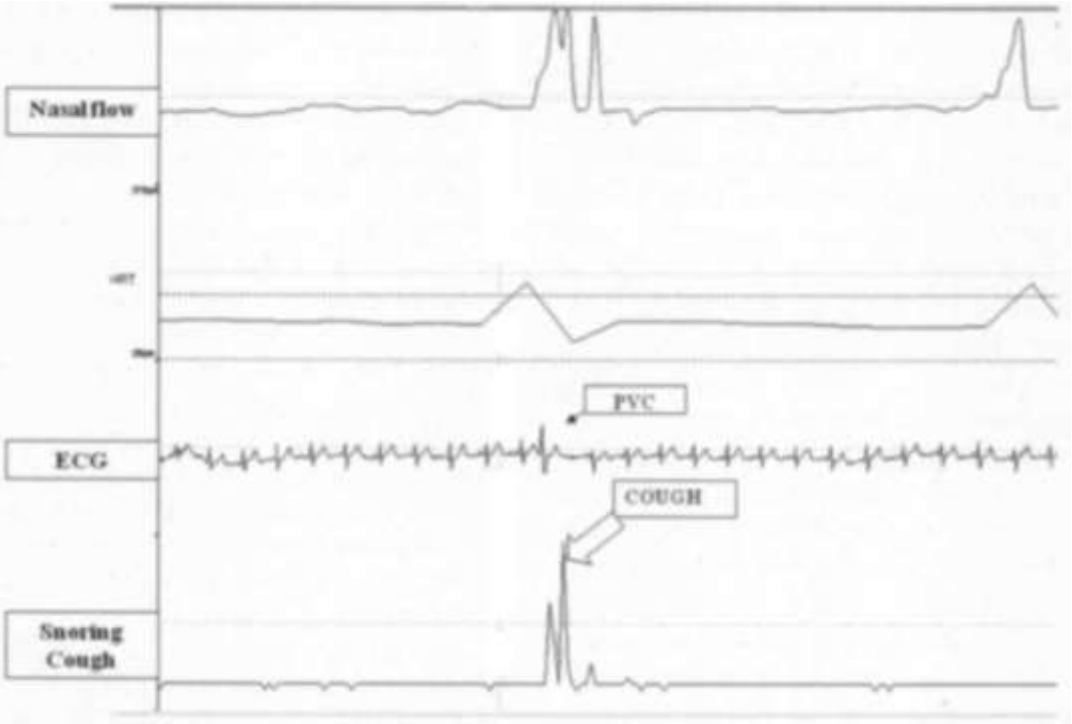
Symptoms related to PVCs

Symptoms:	
Palpitations	54 (64%)
Unpleasant feeling of extra heartbeats	45 (53%)
Dyspnoea	39 (47%)
Reduced physical capacity	37 (44%)
Chronic fatigue	36 (43%)
Dizziness	35 (42%)
Chest pain	34 (40%)
Blurred vision or eye flashes	16 (19%)
Presyncope	15 (18%)
Syncope	10 (12%)
Arrhythmia-associated cough	5 (6%)
Arrhythmia-associated dysphagia	5 (6%)

CHEST Original Research
COUGH

Diagnosis and Management of Premature Ventricular Complexes-Associated Chronic Cough*

Sebastian M. Stec, MD; Elżbieta M. Grabczak, MD; Piotr Bielicki, MD; Beata Zaborska, MD; Rafał Krenke, MD; Tomasz Kryński, MD; Marta Dąbrowska, MD; Joanna Domagała-Kulawik, MD; Anna Domeracka-Kołodziej, MD; Agnieszka Sikorska, MD; Piotr Kułakowski, MD; and Ryszarda Chazan, MD, FCCP



CHEST 2009;135:1535-1541

Videofluoroscopic Modified Barium Swallow Study for Premature Ventricular Complexes–Associated Dysphagia

Sebastian Stec, MD; Wieslaw Tarnowski, MD, PhD; Artur Binda, MD;
Piotr Kulakowski, MD, PhD, FESC

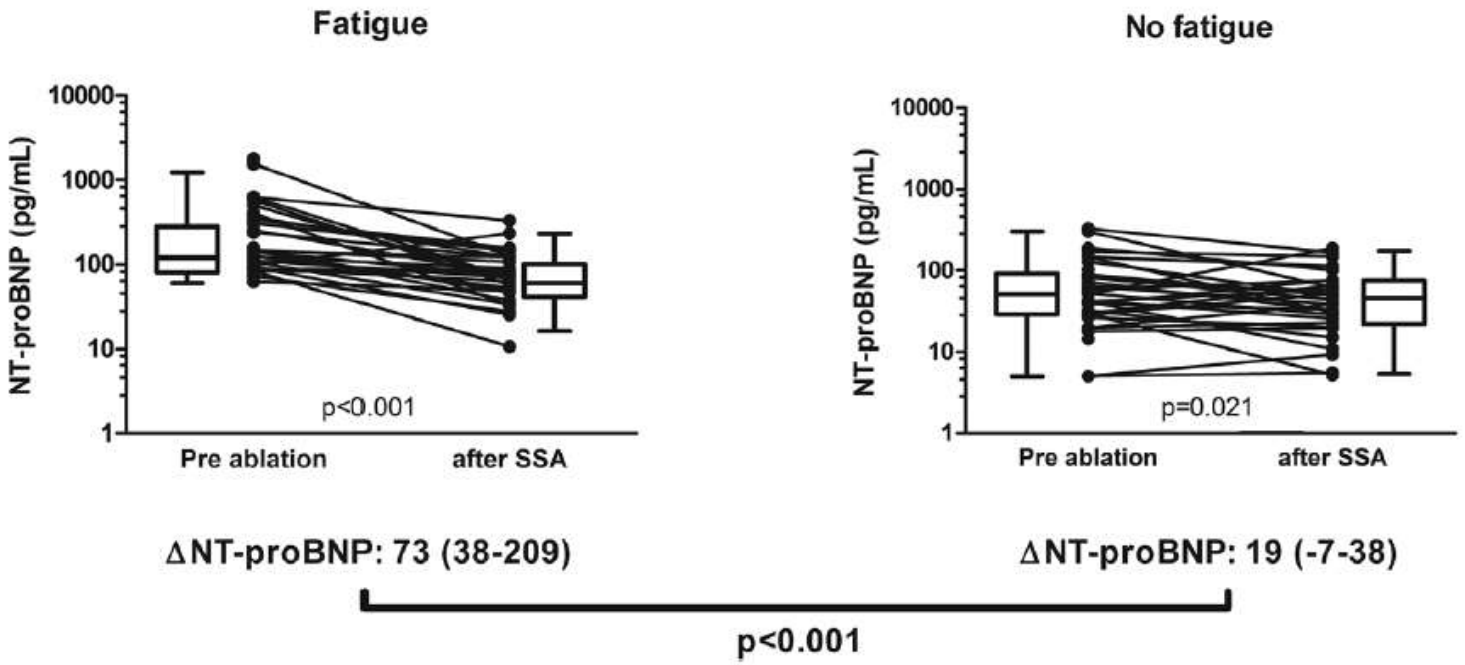
- During sinus rhythm, no symptoms of dysphagia and no abnormalities in barium passage through the esophagus were documented . During frequent PVC, however, the patient reported difficulty swallowing and intraesophageal reflux, and prolonged barium deposits in the upper esophagus were documented .

- In esophageal manometry during sinus rhythm, no significant abnormalities were found; however, during frequent PVC, esophageal spasm and abnormal motility were documented

Circ Arrhythmia Electrophysiol. **2008;1:e1.)**

Fatigue as Presenting Symptom and a High Burden of Premature Ventricular Contractions Are Independently Associated With Increased Ventricular Wall Stress in Patients With Normal Left Ventricular Function

Carine F.B. van Huls van Taxis, MD; Sebastiaan R.D. Piers, MD; Marta de Riva Silva, MD; Olaf M. Dekkers, PhD; Daniël A. Pijnappels, PhD; Martin J. Schalij, MD, PhD; Adrianus P. Wijnmaalen, MD, PhD; Katja Zeppenfeld, MD, PhD



Circ Arrhythm Electrophysiol. 2015;8:1452-1459

PVCs: When to ablate?

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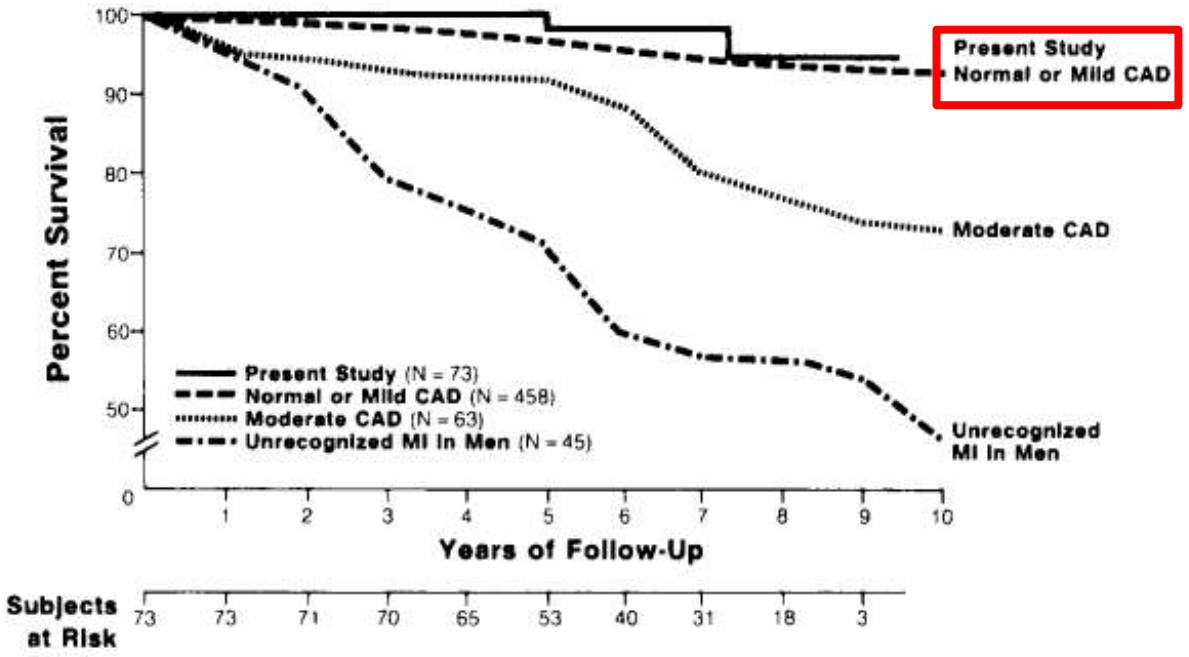
The New England
Journal of Medicine

Volume 312 JANUARY 24, 1985 Number 4

LONG-TERM FOLLOW-UP OF ASYMPTOMATIC HEALTHY SUBJECTS WITH FREQUENT AND COMPLEX VENTRICULAR ECTOPY

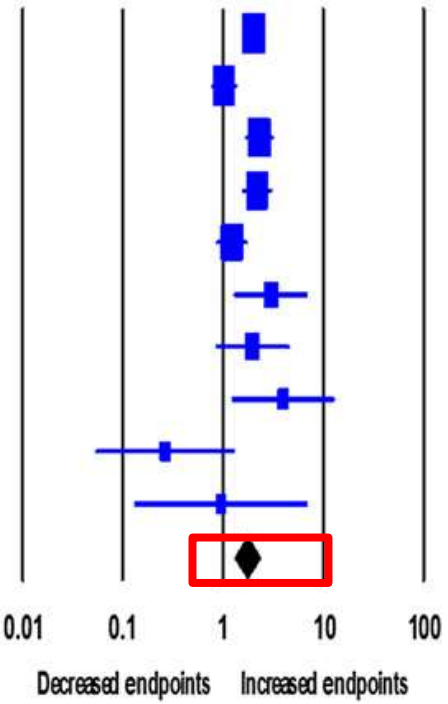
HAROLD L. KENNEDY, M.D., M.P.H., JAMES A. WHITLOCK, B.S., MICHAEL K. SPRAGUE, LISA J. KENNEDY, THOMAS A. BUCKINGHAM, M.D., AND ROBERT J. GOLDBERG, PH.D.



The prognostic significance of premature ventricular complexes in adults without clinically apparent heart disease: a meta-analysis and systematic review

Victor Lee,[1] Harry Hemingway,[2] Rami Harb,[1] Tom Crake,[1] Pier Lambiase[1]

Study name	Study endpoints	OR	Lower limit	Upper limit	Z-Value	p Value
Rabkin *et al*, 1981[16]	IHD	2.033	1.569	2.635	5.369	0.000
Rodstein *et al*, 1971[6]	All Cause Mortality	1.025	0.754	1.393	0.157	0.875
Bikkina *et al* (m), 1992[19]	All Cause Mortality	2.300	1.652	3.203	4.929	0.000
Cheriyath *et al*, 2011[22]	CV Death	2.180	1.527	3.113	4.287	0.000
Bikkina *et al* (f), 1992[19]	All Cause Mortality	1.230	0.852	1.775	1.106	0.269
Abdalla *et al*, 1987[17]	SCD	3.000	1.266	7.109	2.496	0.013
Desai *et al*, 1973[7]	All Cause Mortality	1.971	0.830	4.681	1.537	0.124
Hirose *et al* (m), 2010[21]	CV Death	3.980	1.214	13.046	2.280	0.023
Kennedy *et al*, 1985[12]	All Cause Mortality	0.265	0.053	1.322	-1.620	0.105
Hirose *et al* (f), 2010[21]	CV Death	0.950	0.128	7.026	-0.050	0.960
		1.721	1.281	2.313	3.605	0.000



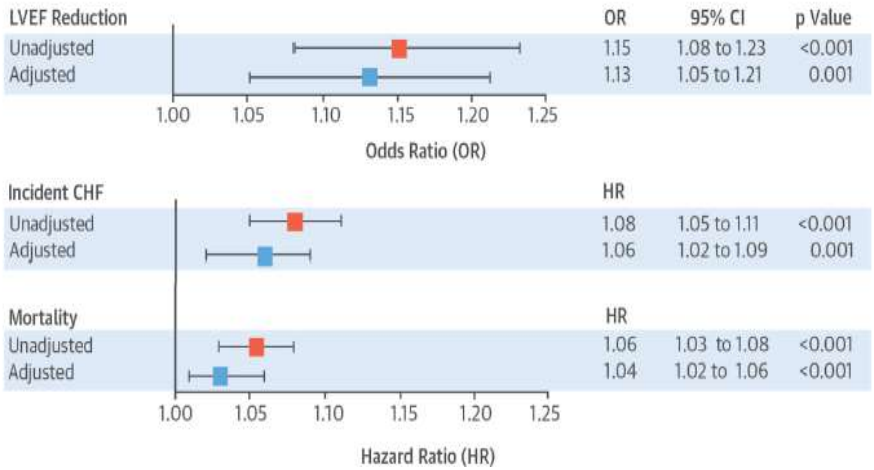
Heart 2012;98:1290-1298

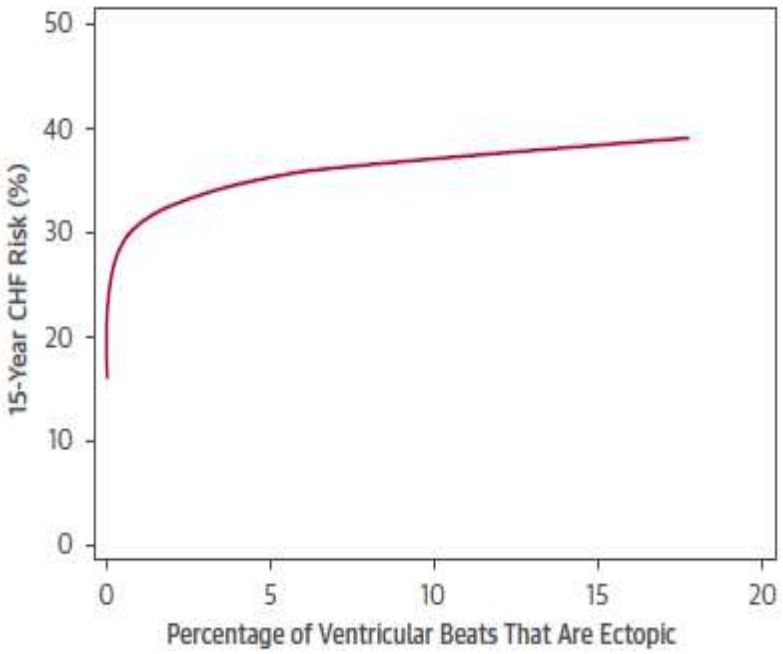
Ventricular Ectopy as a Predictor of Heart Failure and Death

Jonathan W. Dukes, MD,* Thomas A. Dewland, MD,† Eric Vittinghoff, PhD, MPH,‡ Mala C. Mandyam, MD,§ Susan R. Heckbert, MD, PhD,‖ David S. Siscovick, MD, MPH,‖¶ Phyllis K. Stein, PhD,# Bruce M. Psaty, MD, PhD,‖**†† Nona Sotoodehnia, MD,‖‡‡ John S. Gottdiener, MD,§§ Gregory M. Marcus, MD, MAS*

1.139 Cardiovascular Health Study

CENTRAL ILLUSTRATION Associations Between Baseline Percent PVCs and 5-Year Reduction in LVEF, Incident CHF, and Mortality





Dukes, J.W. et al. J Am Coll Cardiol. 2015;66(2):101–9.

Βασική διερεύνηση ατόμων με πολλαπλές ΕΚΣ

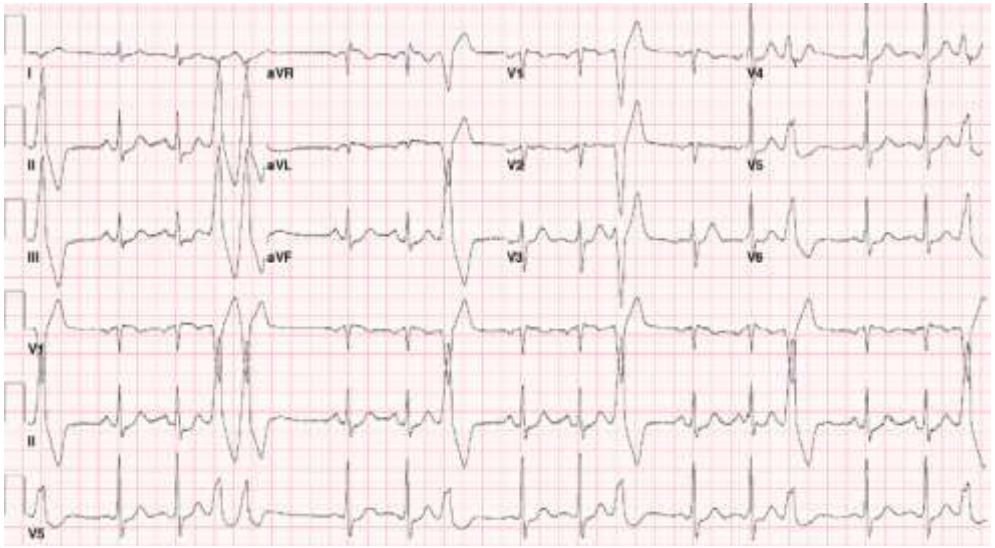
1. Ιστορικό- ατομικό αναμνηστικό, συμπτώματα, συγκοπή, άσκηση-ηρεμία
2. Κληρονομικό αναμνηστικό
3. ΗΚΓ 12 απαγωγών – λεπτομερής ανάλυση
4. Αν είναι δυνατό καταγραφή PVCs/NSVT σε 12 απαγωγές – μορφολογικά κριτήρια
5. Επαναλαμβανόμενα ΗΚΓ
6. Διαθωρακικό Ηχωκαρδιογράφημα
7. Κατά περίπτωση: Coronary angiography, Stress testing, MRI, perfusion scanning, prolonged ECG monitoring/ILR, ΗΦΕ/PVS, Late Potentials,….

Spectrum of PVCs and in pts without structural heart disease

- Right ventricular tachycardias (60%)
  - Right ventricular outflow tract (24,25)
  - Pulmonary artery (26,27)
  - Peri-His (28)
  - Tricuspid annulus
  - Other right ventricular tachycardia
- Left ventricular tachycardias (30%)
  - Fascicular [posterior (29,30) >> anterior (31)]
  - Aortic sinus of Valsalva (32,33)
  - Mitral annulus (34,35)
  - Left ventricular outflow tract endocardium (36,37)
  - Papillary muscle
  - Other left ventricular tachycardia
- Epicardial (9%) (36)
- Bundle branch reentry (1%) (39)

Heart Rhythm 2008;5:S59 –S63

RVOT PVCs
ECG characteristics



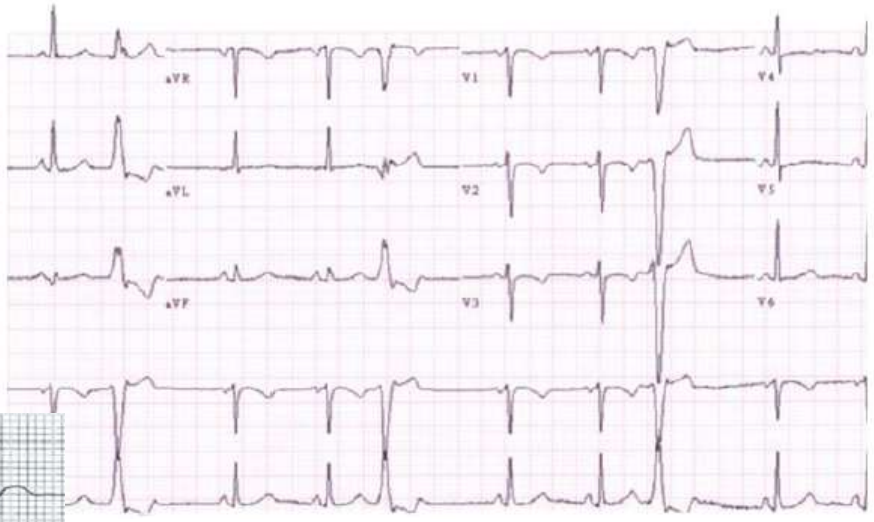
- Ventricular arrhythmias from the RVOT region have an **LBBB QRS morphology with an inferior axis** in the frontal plane
- The precordial transition (from rS to Rs) typically occurs at lead **V4 or later**, and begins no earlier than lead V3

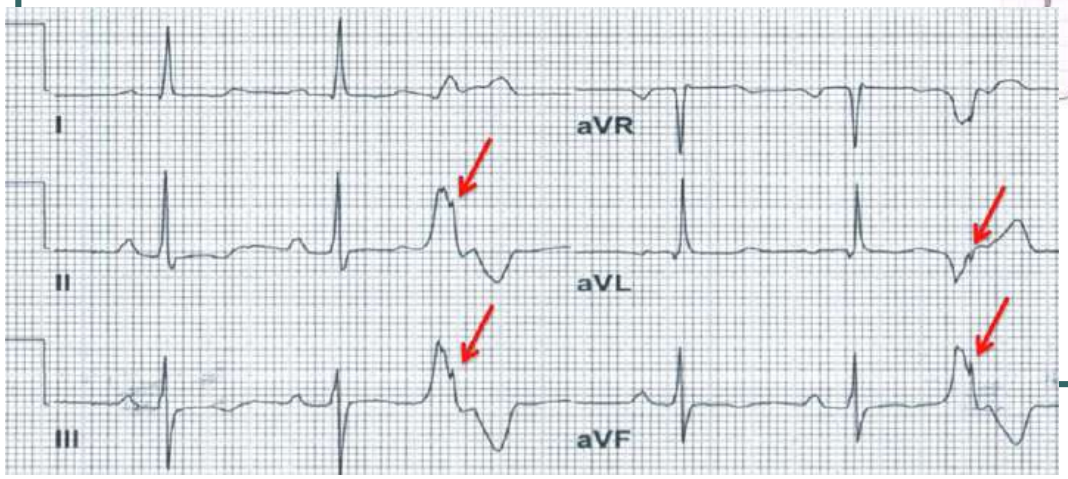
An electrocardiographic scoring system for distinguishing right ventricular outflow tract arrhythmias in patients with arrhythmogenic right ventricular cardiomyopathy from idiopathic ventricular tachycardia

Kurt S. Hoffmayer, MD,[*] Prashant D. Bhave, MD,[†] Gregory M. Marcus, MD, MAS, FHRS,[*] Cynthia A. James, PhD,[‡] Crystal Tichnell, MGC,[‡] Nagesh Chopra, MD,[§] Laura Moxey, BSc, CCRA, CCRP,[‖] Andrew D. Krahn, MD, FHRS,[‖] Sanjay Dixit, MD, FHRS,[¶] William Stevenson, MD, FHRS,[§] Hugh Calkins, MD, FHRS,[‡] Nitish Badhwar, MBBS,[*] Edward P. Gerstenfeld, MD, FHRS,[*] Melvin M. Scheinman, MD, FHRS[*]

Table 1 Electrocardiographic ARVD/C risk score

ECG characteristic	Points
Anterior T-wave inversions (V_1–V_3) in sinus rhythm	3
VT/PVC	
Lead I QRS duration ≥120 ms	2
QRS notching (multiple leads)	2
V_5 transition or later	1
Maximum total	8





Heart Rhythm 2013;10:477-82

PVCs: When to ablate?

Critical Questions that should be answered

- Are they symptomatic?
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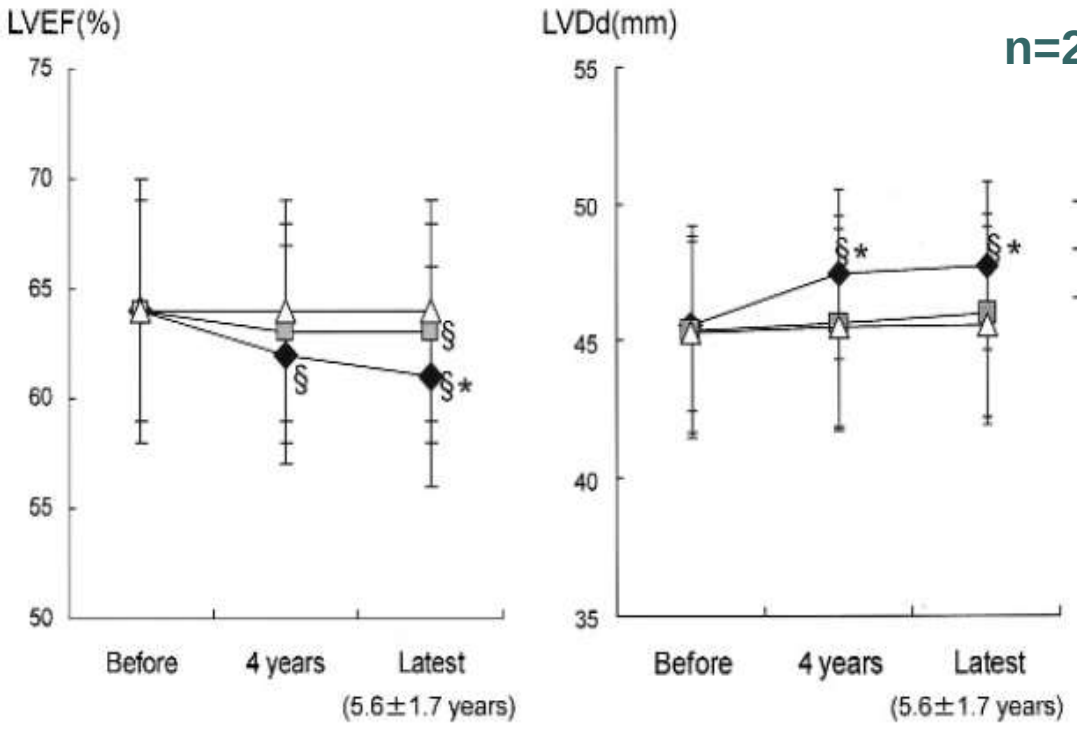
- Does PVCs induced cardiomyopathy exist?
- Identify those patients with frequent PVCs who are at increased risk of developing PVC-induced cardiomyopathy
- Is ablation an effective therapy?
- Which group of patients will benefit most?

Prognostic significance of frequent premature ventricular contractions originating from the ventricular outflow tract in patients with normal left ventricular function

S Niwano, Y Wakisaka, H Niwano, H Fukaya, S Kurokawa, M Kiryu, Y Hatakeyama, T Izumi



n=289 pts

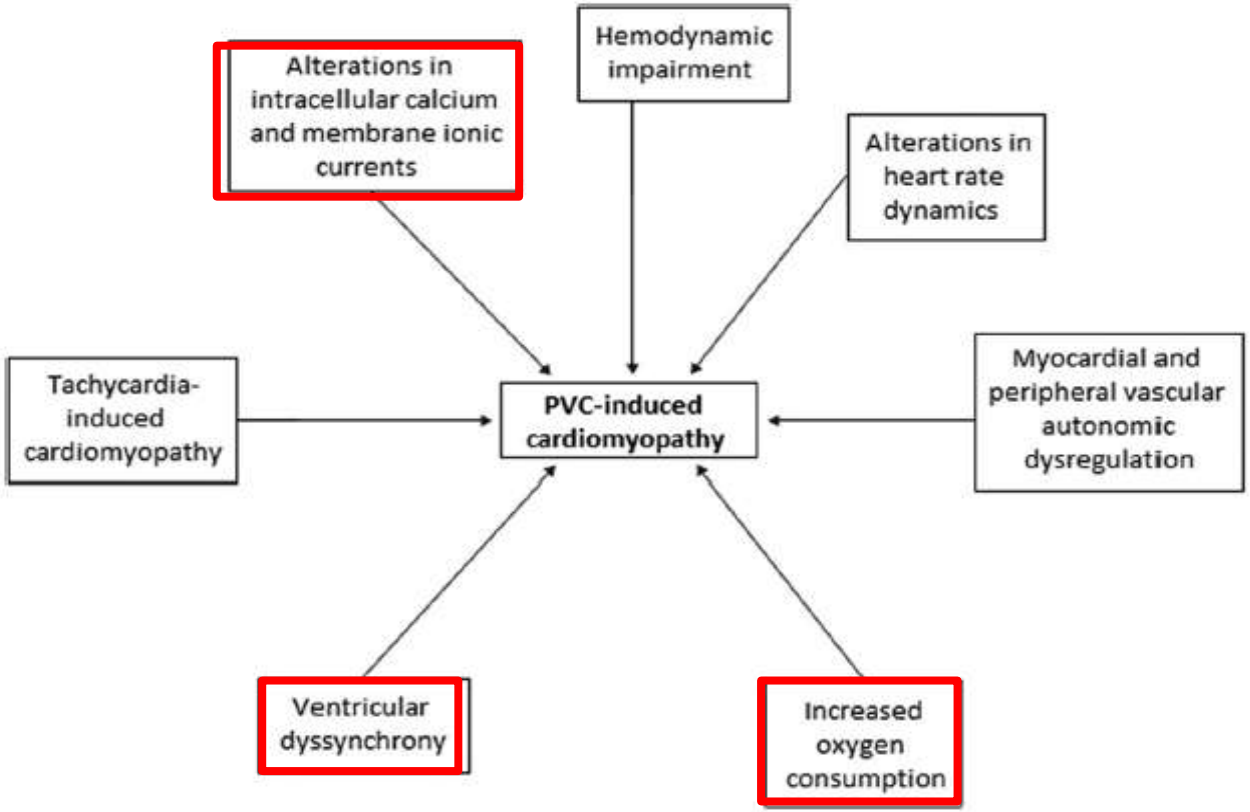
>20.000/day

5.000-20000

1000-5000

Heart 2009;95:1230–1237

Putative mechanisms of PVCs induced Cardiomyopathy



Circ Arrhythm Electrophysiol. 2012;5:229-236

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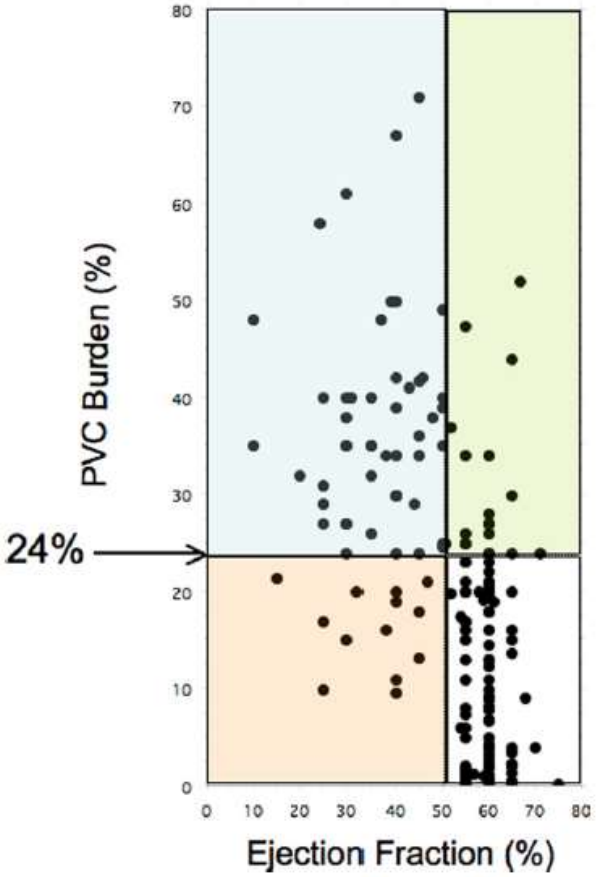
- Is ablation an effective therapy?
- Which group of patients will benefit most?

Relationship between burden of premature ventricular complexes and left ventricular function

Timir S. Baman, MD,* Dave C. Lange, MD,* Karl J. Ilg, MD,* Sanjaya K. Gupta, MD,* Tzu-Yu Liu, MS,† Craig Alguire, MD,* William Armstrong, MD, FACC,* Eric Good, DO, FACC,* Aman Chugh, MD, FACC,* Krit Jongnarangsin, MD,* Frank Pelosi, Jr., MD,* Thomas Crawford, MD,* Matthew Ebinger, MD, DO,* Hakan Oral, MD, FACC,* Fred Morady, MD, FACC,* Frank Bogun, MD, FACC*



Heart Rhythm 2010;7:865–869

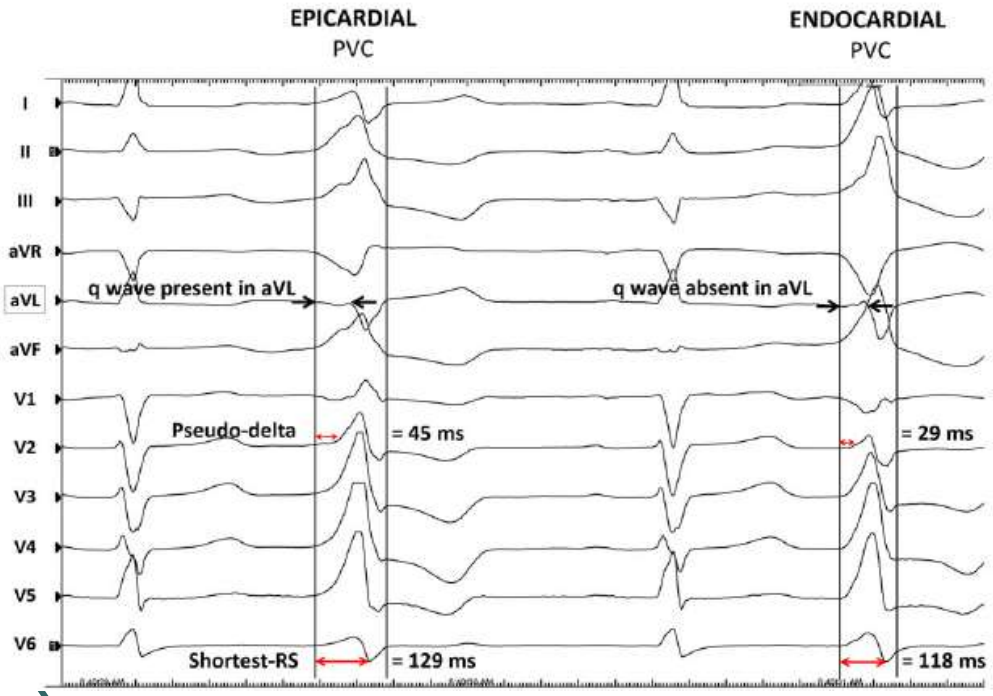
Additional Predisposing Factors of VPC-Induced Cardiomyopathy

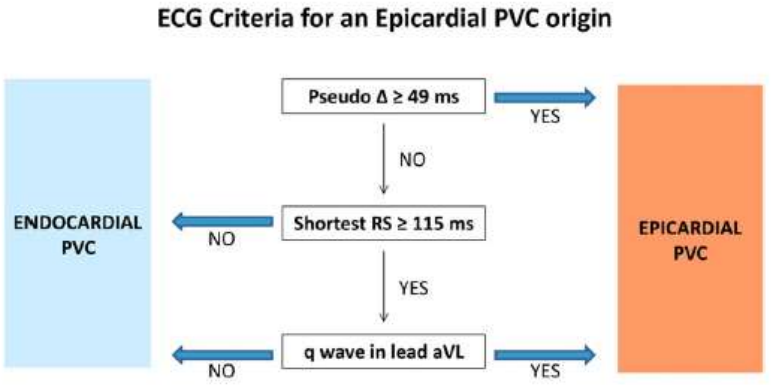
- **VPC QRS width (>140 ms)**
- burden of interpolated VPCs
- presence of NSVT
- **multiform VPCs**
- VPCs of right ventricular origin
- VPCs with retrograde P wave
- **Long exposure to frequent PVCs**
- Circadian variability in frequency of PVCs

del Carpio Munoz F, et al. J Cardiovasc Electrophysiol 2011;22:791-8
Yokokawa M, et al. Heart Rhythm 2012;9:1460-4
Olgun H, et al. Heart Rhythm 2011;8:1046-9
Bas H et al. Heart Rhythm 2016;13:98-102

A New Combined Parameter to Predict Premature Ventricular Complexes Induced Cardiomyopathy: Impact and Recognition of Epicardial Origin

DAVID HAMON, M.D.,*,† MARIE SADRON BLAYE-FELICE, M.D.,‡ JASON S. BRADFIELD, M.D.,† NAJIA CHAACHOUI, M.D.,* RODERICK TUNG, M.D.,† CLAUDE S. ELAYI, M.D.,§ MARMAR VASEGHI, M.D., M.S.,† TARVINDER S. DHANJAL, M.D., PH.D.,* NOEL G. BOYLE, M.D., PH.D.,† PHILIPPE MAURY, M.D., PH.D.,‡ KALYANAM SHIVKUMAR, M.D., PH.D.,† and NICOLAS LELLOUCHE, M.D., PH.D.*





J Cardiovasc Electrophysiol, 2016;27:709-717

A New Combined Parameter to Predict Premature Ventricular Complexes Induced Cardiomyopathy: Impact and Recognition of Epicardial Origin

Multivariate Analysis for Parameters Associated With PVC-CMP

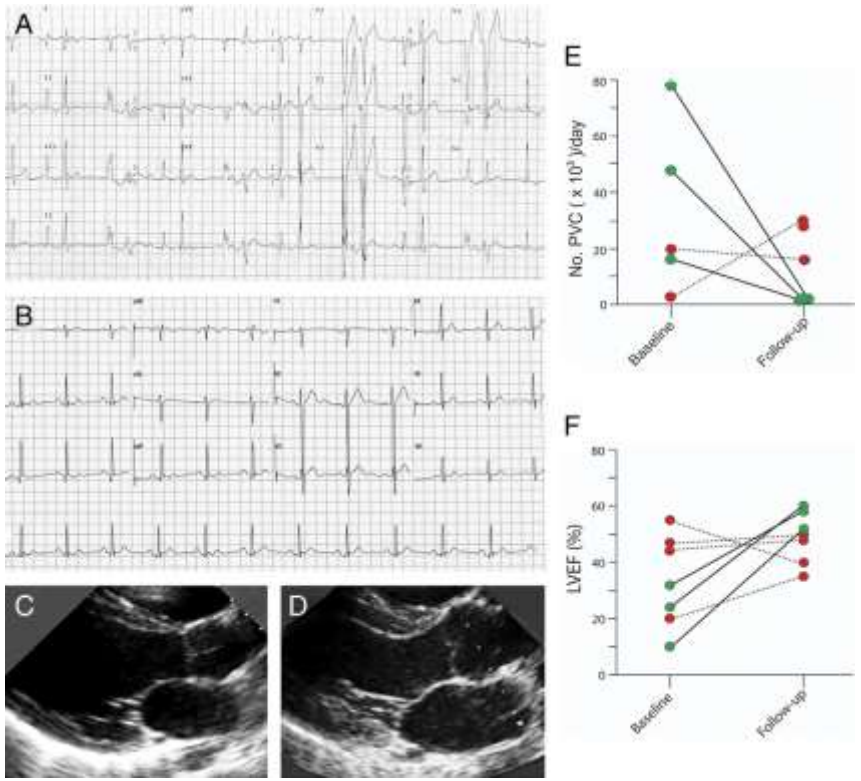
Variables	Odds Ratio	95% CI	P Value
Male	1.06	0.17–6.54	0.952
Structural heart disease	12.30	1.63–92.58	0.015
Interpolation	19.72	0.28–1363	0.168
Coupling	0.98	0.97–1.00	0.050
Epicardial origin	68.74	3.54–1363	0.005
Sinus beat QRS width	1.04	1.00–1.08	0.066
PVC Burden	1.25	1.10–1.42	<0.001
PVC-QRS width	1.07	1.01–1.12	0.016
Right ventricle origin	0.22	0.04–1.28	0.092
Palpitations	0.04	0.01–0.55	0.011

J Cardiovasc Electrophysiol, 2016;27:709-717

R222Q *SCN5A* Mutation Is Associated With Reversible Ventricular Ectopy and Dilated Cardiomyopathy

Stefan A. Mann, PHD,* Maria L. Castro, BMEDSCI(HONS),* Monique Ohanian, BMEDSCI(HONS),* Guanglan Guo, PHD,* Poonam Zodgekar, MSW, GRADDIPGENCOUNS,* Angela Sheu, MB, BS,* Kathryn Stockhammer, BSC, GRADDIPGENCOUNS,* Tina Thompson, BNURS,† David Playford, MB, BS, PHD,‡ Rajesh Subbiah, MB, BS, PHD,§‖ Dennis Kuchar, MD,§ Anu Aggarwal, MB, BS, PHD,† Jamie I. Vandenberg, MB, BS, PHD,*‖ Diane Fatkin, MD*§‖

Darlinghurst, New South Wales; Parkville, Victoria; Armadale, Western Australia; and Kensington, New South Wales, Australia



J Am Coll Cardiol 2012;60:1566–73

PVCs: When to ablate?

Critical Questions that should be answered

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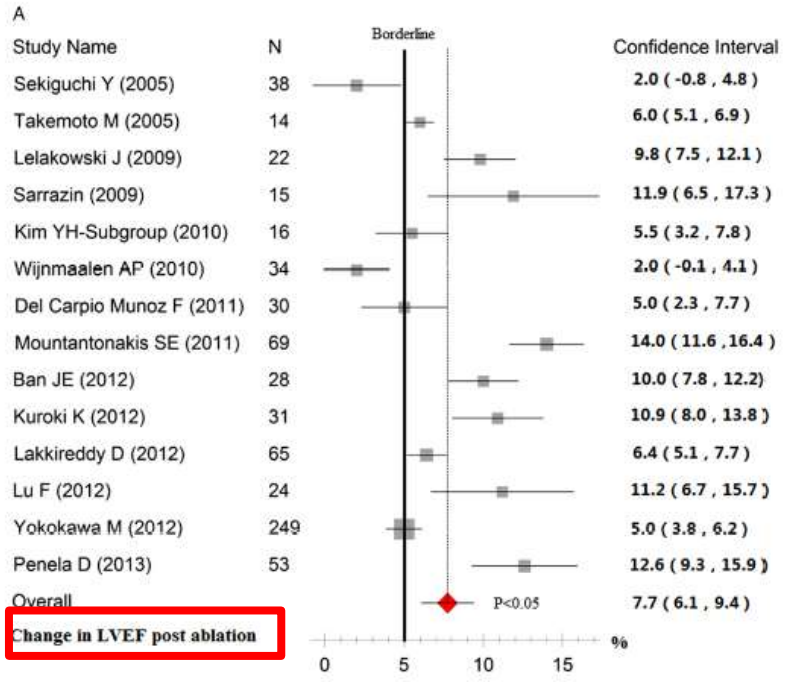
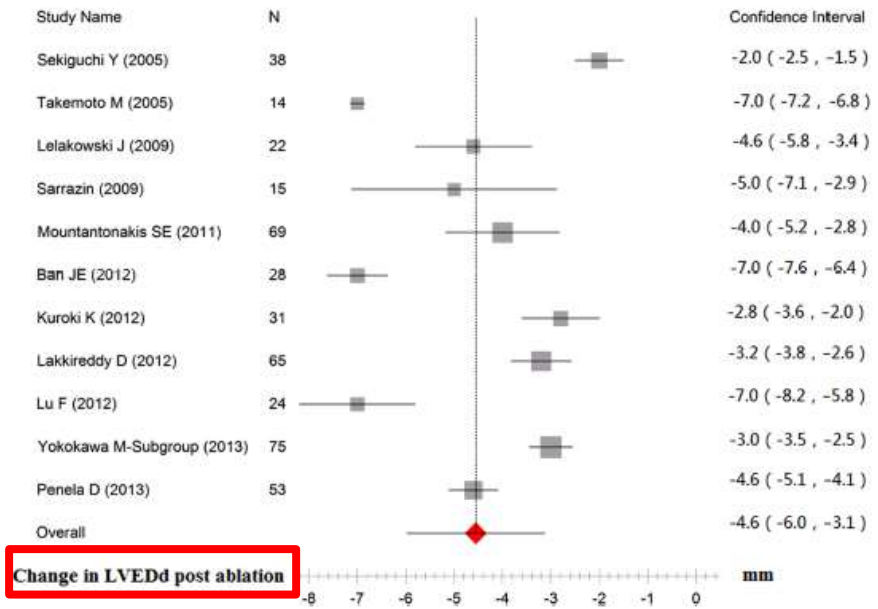
- Does PVCs induced cardiomyopathy exist?
- Is there a cut off PVCs burden associated with impaired LV function?
- Is ablation an effective therapy?

Beneficial effects of catheter ablation of frequent premature ventricular complexes on left ventricular function





Zang M et al. Heart 2014;100:787-93

Radiofrequency Ablation Versus Antiarrhythmic Medication for Treatment of Ventricular Premature Beats From the Right Ventricular Outflow Tract

Prospective Randomized Study

Zhiyu Ling, MD, PhD*; Zengzhang Liu, MD*; Li Su, MD, PhD; Vadim Zipunnikov, PhD; Jinjin Wu, MD; Huaan Du, MD, PhD; Kamsang Woo, MD; Shaojie Chen, MD, PhD; Bin Zhong, MD; Xianbin Lan, MD; Jinqi Fan, MD, PhD; Yanping Xu, MD; Weijie Chen, MD; Yuehui Yin, MD; Saman Nazarian, MD, PhD; Bernhard Zrenner, MD

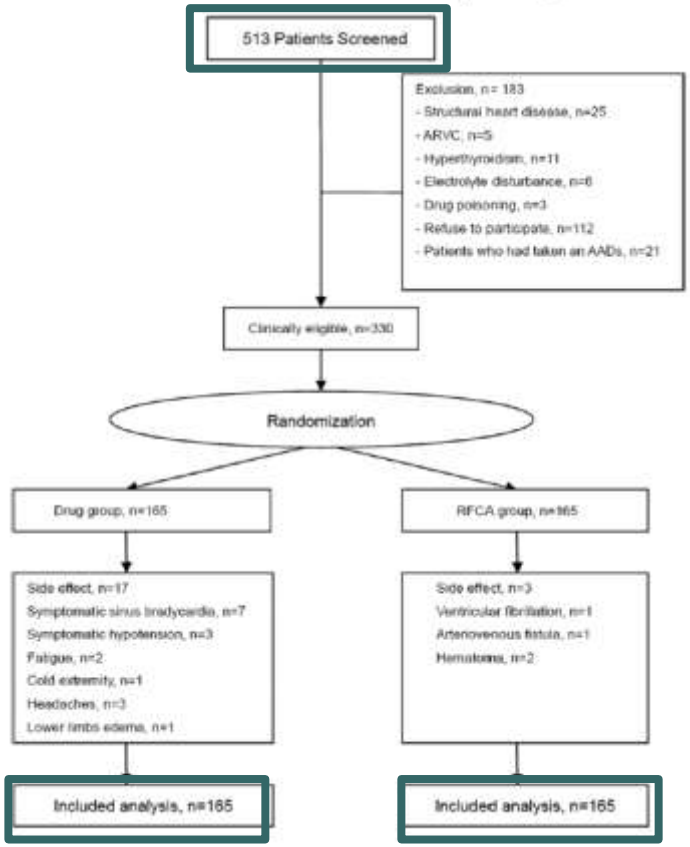


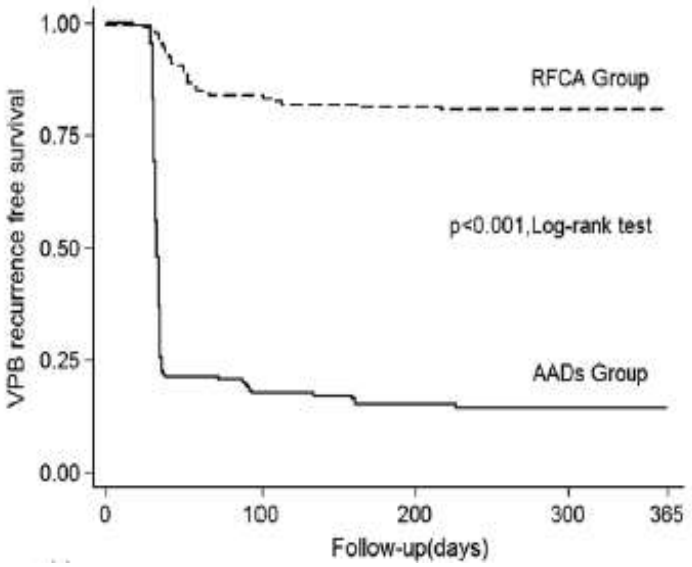
Table 1. Baseline Characteristics* of Study Patients

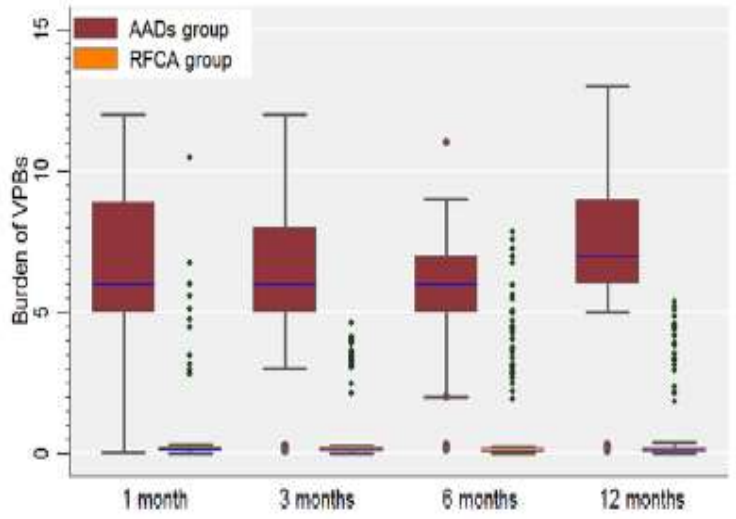
	AADs Group (n=165)	RFCA Group (n=165)
Age, y	50.54±11.52	52.68±10.37
Women n (%)	125 (75.8%)	118 (71.5%)
VPB burden, %	14 (IQR: 12, 21)	14 (IQR: 12, 21)
VPB numbers	13823 (IQR: 11948, 19892)	14049 (IQR: 11882, 19535)
Hypertension (n)	11 (165)	10 (165)
LAD, mm	34.39±2.65	34.78±2.76
LVEF, %	64.48±4.89	64.07±5.21
BMI, kg/m^2	24.38±2.53	23.89±2.36
Systolic BP, mm Hg	130.58±7.52	128.15±7.23
Diastolic BP, mm Hg	80.47±7.61	77.84±5.56

Circ Arrhythm Electrophysiol. 2014;7:237-43

Radiofrequency Ablation Versus Antiarrhythmic Medication for Treatment of Ventricular Premature Beats From the Right Ventricular Outflow Tract

Prospective Randomized Study





Ling Z, et al. Circ Arrhythm Electrophysiol. 2014;7:237-243

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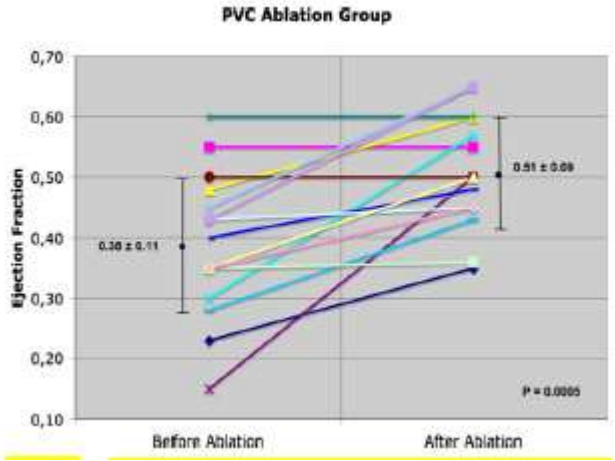
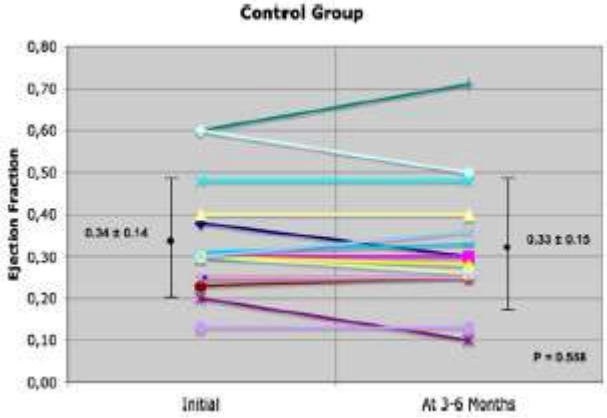
- Is ablation an effective therapy?
- Which group of patients will benefit most?

Impact of radiofrequency ablation of frequent post-infarction premature ventricular complexes on left ventricular ejection fraction

Jean-Francois Sarrazin, MD, Troy Labounty, MD, Michael Kuhne, MD, Thomas Crawford, MD, William F. Armstrong, MD, Benoit Desjardins, MD, Eric Good, DO, Krit Jongnarangsin, MD, Aman Chugh, MD, Hakan Oral, MD, Frank Pelosi, MD, Fred Morady, MD, Frank Bogun, MD

- n=30 pts

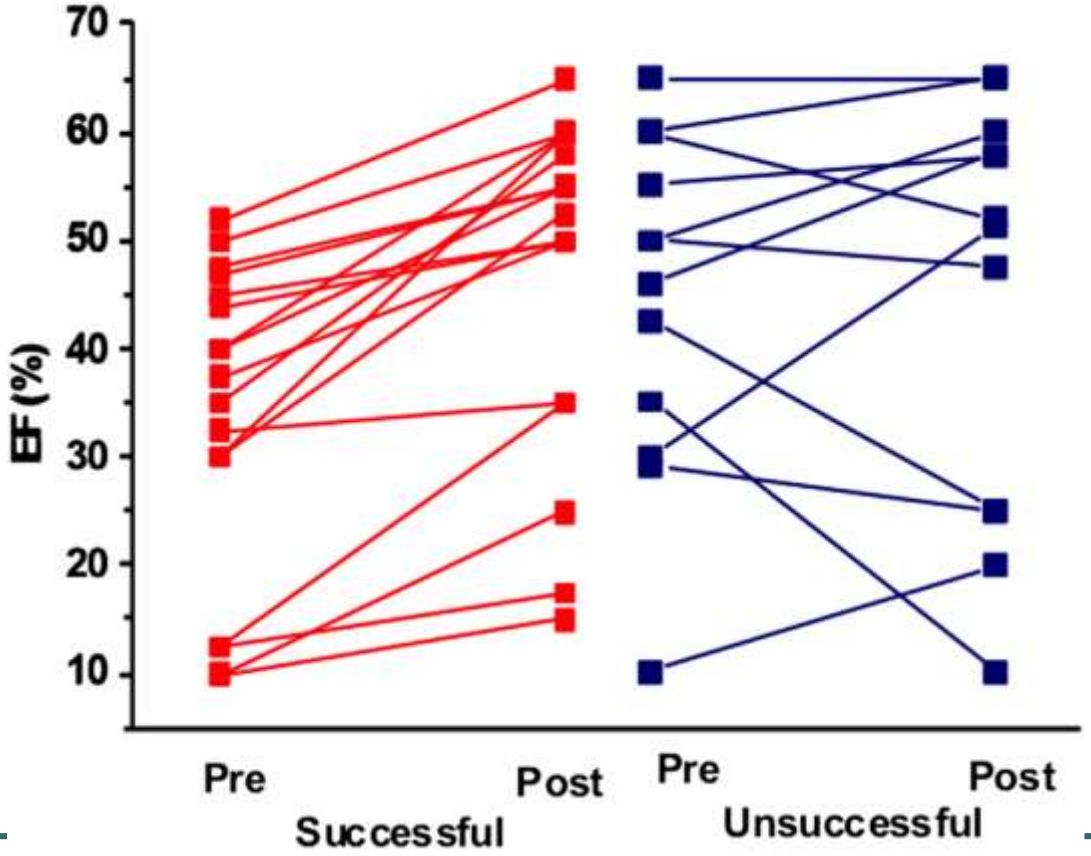




Heart Rhythm 2009;6:1543–1549

Effect of ablation of frequent premature ventricular complexes on left ventricular function in patients with nonischemic cardiomyopathy

Moutaz El Kadri, MD,[†] Miki Yokokawa, MD,[†] Troy Labounty, MD,[†] Gisela Mueller, MD,[*] Thomas Crawford, MD,[†] Eric Good, DO, FACC,[†] Krit Jongnarangsin, MD,[†] Aman Chugh, MD,[†] Hamid Ghanbari, MD,[†] Rakesh Latchamsetty, MD,[†] Hakan Oral, MD, FACC,[†] Frank Pelosi, MD, FACC,[†] Fred Morady, MD, FACC,[†] Frank Bogun, MD, FACC[†]



n=30 pts

Heart Rhythm 2015;12:706–713

Radiofrequency Ablation of Premature Ventricular Ectopy Improves the Efficacy of Cardiac Resynchronization Therapy in Nonresponders

Table 4 Change in Various Echo Parameters Before and After PVC Ablation

Change in Echo Parameters	Pre-Ablation	Post-Ablation	Mean Improvement	p Value
Δ EF	26.2 ± 5.5	32.7 ± 6.7	6.42 ± 5.26	<0.001
Δ LVEDD	6.83 ± 0.83	6.51 ± 0.91	−0.32 ± 0.26	<0.001
Δ LVESD	5.83 ± 0.55	5.62 ± 0.32	−0.31 ± 0.23	<0.001
Δ LVESV	178 ± 72	145 ± 23	−33.17 ± 22.94	<0.001
Δ LVEDV	242 ± 85	212 ± 63	−30.65 ± 21.63	<0.001

Table 6 Improvements in Echo Parameters and NYHA Class Post-Ablation With Percentage of Pre-Ablation PVC Burden Stratified to <22% and >22%

Change in Echo Parameters	Pre-Ablation PVC Ablation		Independent *t* Test p Value
	≤22.0%, n = 33	>22.0%, n = 32	
Δ EF	4.79 ± 7.25	12.66 ± 7.54	<0.001
Δ LVEDD	−0.18 ± 0.18	−0.47 ± 0.24	<0.001
Δ LVESD	−0.17 ± 0.19	−0.46 ± 0.18	<0.001
Δ LVESV	−18.7 ± 15.4	−48.1 ± 19.8	<0.001
Δ LVEDV	−16.0 ± 17.8	−45.8 ± 13.2	<0.001
Δ NYHA class	−1.00 (−1.00, 0.00)	−1.0 (−1.00, 0.00)	0.525*

Lakkireddy D et al. JACC 2012;60:1531-1539

European Heart Journal (2015) 36, 2793–2867
doi:10.1093/eurheartj/ehv316

2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

The Task Force for the Management of Patients with Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC)

Treatment of outflow tract ventricular tachycardia

Recommendations	Class[a]	Level[b]	Ref.[c]
Catheter ablation of RVOT VT/PVC is recommended in symptomatic patients and/or in patients with a failure of anti-arrhythmic drug therapy (e.g. beta-blocker) or in patients with a decline in LV function due to RVOT-PVC burden.	I	B	525–528
Treatment with sodium channel blockers (class IC agents) is recommended in LVOT/aortic cusp/epicardial VT/PVC symptomatic patients.	I	C	529–531
Catheter ablation of LVOT/aortic cusp/epicardial VT/PVC by experienced operators after failure of one or more sodium channel blockers (class IC agents) or in patients not wanting long-term anti-arrhythmic drug therapy should be considered in symptomatic patients.	IIa	B	195, 531–533

Malignant Entity of Idiopathic Ventricular Fibrillation and Polymorphic Ventricular Tachycardia Initiated by Premature Extrasystoles Originating From the Right Ventricular Outflow Tract

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J Am Coll Cardiol 2005;46:1288 –94

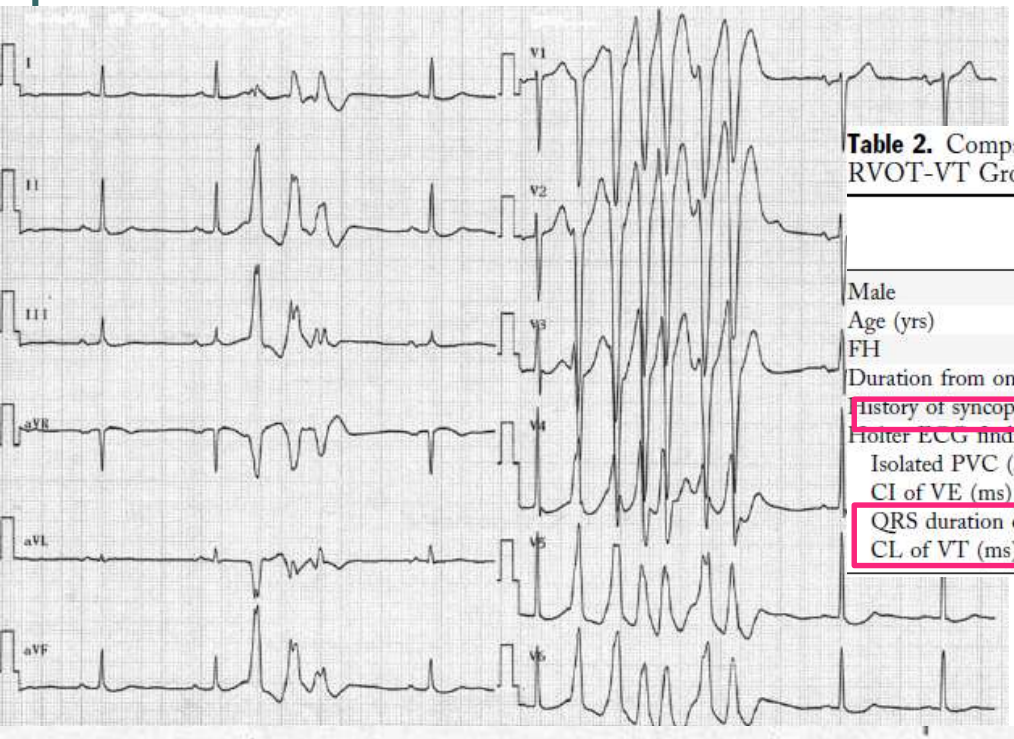
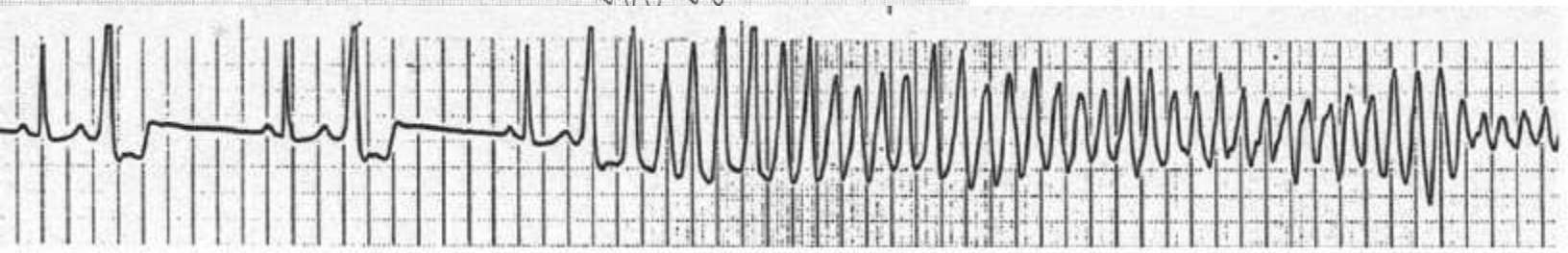


Table 2. Comparison of the Clinical Parameters Between the VF/PVT Group and the RVOT-VT Group

	VF/PVT Group (n = 16)	RVOT-VT Group (n = 85)	p Value
Male	7/16 (44%)	25/85 (29%)	0.26
Age (yrs)	39 ± 10	43 ± 14	0.19
FH	1/16	1/85	0.29
Duration from onset of symptom to RFCA (months)	80 ± 103	69 ± 79	0.71
History of syncope	11/16 (69%)	15/85 (18%)	0.0001
Holter ECG findings			
Isolated PVC (/day)	17,554 ± 11,338	15,506 ± 16,053	0.58
CI of VE (ms)	409 ± 62	428 ± 65	0.27
QRS duration of VE (ms)	148 ± 8	142 ± 12	0.03
CL of VT (ms)	245 ± 28	328 ± 65	<0.0001



Conclusions

- PVC ablation efficacy and safety are reasonably good but limitations should be respected
- The majority of pt with high density PVC do not develop cardiomyopathy
- PVC induced cardiomyopathy is usually reversible
- the suppression of PVCs is indicated for symptomatic pts with frequent PVCs and those with overt LV dysfunction

FUTURE DIRECTIONS

- NCT01757067 [Early Elimination of Premature Ventricular Contractions in Heart Failure (EVAC-HF)] is a prospective, randomized study that will compare the effects on LVEF in patients with **non ischemic cardiomyopathy with LVEF45% and >20% PVCs** following ablation or optimal medical therapy

- NCT01566344 a randomized prospective study with **idiopathic or postinfarction cardiomyopathy (LVEF<50%) and 15% monomorphic PVCs** to either conventional heart failure therapy and PVC suppression therapy (ablation or amiodarone if unsuccessful ablation) or heart failure therapy alone