Risk stratification for Sudden Cardiac Death

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Conflict of interest

Dr. K.A. Gatzoulis received a supporting grand for PRESERVE-EF study equipment by Medtronic and GE
One-year mortality as a function of radionuclide ejection fraction (per cent) measured at hospital discharge after acute myocardial infarction. The solid line between the dashed lines indicates the corresponding 95 per cent confidence interval. The calculations are based on pooled data from the Multicenter Postinfarction Study and the Thoraxcenter. (From Serray, P. W., et al.: Preservation of global and regional left ventricular function after early thrombolysis in acute myocardial infarction. J. Am. Coll. Cardiol. 7:729, 1986. By permission of the American College of Cardiology.)
LVEF Limitations

- Variability over time (surgery, PTCA, drugs, natural history).
- Stronger association with total mortality.
- Intra and inter observer variability in LVEF estimation.
- 2/3 of SCD in patients with LVEF ≥35%.
- Non invasive markers predict risk in patients with LVEF >40%.
Population-Based Analysis of Sudden Cardiac Death With and Without Left Ventricular Systolic Dysfunction

Two-Year Findings from the Oregon Sudden Unexpected Death Study

Eric C. Stecker, MD, Catherine Vickers, RN, Justin Waltz, MPH, Carmen Socoteanu, MD, Benjamin T. John, MD, Ronald Mariani, EMT-P, John H. McAnulty, MD, FACC, Karen Gunson, MD, Jonathan Jui, MD, MPH, Sumeet S. Chugh, MD, FACC

Portland, Oregon

Table 2. Clinical Characteristics of SCD Cases That Underwent Evaluation of LV Function

<table>
<thead>
<tr>
<th></th>
<th>Reduced EF</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Severe (n = 36)</td>
<td>Mild/Moderate (n = 27)</td>
<td>Normal EF (n = 58)</td>
<td>p Value*</td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>74 ± 11</td>
<td>73 ± 9.1</td>
<td>66 ± 15</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>9 (25%)</td>
<td>8 (30%)</td>
<td>27 (47%)</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Attempted resuscitation</td>
<td>23 (64%)</td>
<td>19 (70%)</td>
<td>38 (66%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CAD</td>
<td>27 (75%)</td>
<td>24 (89%)</td>
<td>29 (50%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Prior SCD</td>
<td>2 (6%)</td>
<td>1 (4%)</td>
<td>3 (5%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td>11 (31%)</td>
<td>9 (33%)</td>
<td>19 (33%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>25 (69%)</td>
<td>19 (70%)</td>
<td>35 (60%)</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>21 (58%)</td>
<td>15 (56%)</td>
<td>23 (40%)</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Seizure disorder</td>
<td>0</td>
<td>0</td>
<td>8 (14%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Prior CVA</td>
<td>4 (11%)</td>
<td>5 (19%)</td>
<td>9 (16%)</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>4 (11%)</td>
<td>3 (11%)</td>
<td>6 (10%)</td>
<td>0.89</td>
<td></td>
</tr>
</tbody>
</table>

*p value for difference between any reduction in EF and normal EF.
CAD = obstructive coronary artery disease; CVA = cerebrovascular accident; DM = diabetes mellitus; EF = ejection fraction; LV = left ventricular; SCD = sudden cardiac death.
Out-of-hospital cardiac arrest—the relevance of heart failure. The Maastricht Circulatory Arrest Registry

Anton P.M. Gorgels*, Claudia Gijsbers, Jacqueline de Vreede-Swagemakers, Aimee Lousberg, Hein J.J. Wellens

Table 4  Aetiology in known CAD victims

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>Nr cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>171/224</td>
</tr>
<tr>
<td>New MI</td>
<td>10/171</td>
</tr>
<tr>
<td>Previous MI</td>
<td>113/171</td>
</tr>
<tr>
<td>Time first MI-SCA</td>
<td>9.7±7.5</td>
</tr>
<tr>
<td>Anterior MI</td>
<td>42/113</td>
</tr>
<tr>
<td>Inferior MI</td>
<td>60/13</td>
</tr>
<tr>
<td>Previous PTCA</td>
<td>40/171</td>
</tr>
<tr>
<td>Previous CABG</td>
<td>50/171</td>
</tr>
</tbody>
</table>

Table 5  Aetiology in no CAD group

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>n=53</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic dilated cardiomyopathy</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Hypertensive heart disease</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Other cardiac causes</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>No cardiac abnormalities</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Heart failure cause unknown</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Unknown</td>
<td>8</td>
<td>15</td>
</tr>
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</table>

Table 6  Aetiology EF >50% SCA group

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>n=101</th>
<th>HF (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>72</td>
<td>4</td>
</tr>
<tr>
<td>Infarction</td>
<td>39</td>
<td>3</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Hypertensive heart disease</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Heart failure cause unknown</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dilated cardiomyopathy</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Other cardiac causes</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>No cardiac abnormalities</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>6</td>
<td>0</td>
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</tbody>
</table>
Out-of-hospital cardiac arrest—the relevance of heart failure. The Maastricht Circulatory Arrest Registry

Anton P.M. Gorgels*, Claudia Gijsbers, Jacqueline de Vreede-Swagemakers, Aimee Lousberg, Hein J.J. Wellens

Table 2 Heart failure variables in the SCA group with a previous cardiac history

<table>
<thead>
<tr>
<th>Heart failure</th>
<th>No heart failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function class</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
</tr>
</tbody>
</table>

LVEF
<table>
<thead>
<tr>
<th></th>
<th>n=9258</th>
<th>n=200</th>
<th>%</th>
<th>p</th>
<th>n=81</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30%</td>
<td>508</td>
<td>38</td>
<td>7.5</td>
<td>.000</td>
<td>26</td>
<td>5.1</td>
</tr>
<tr>
<td>31–40%</td>
<td>628</td>
<td>32</td>
<td>5.1</td>
<td>.000</td>
<td>14</td>
<td>2.2</td>
</tr>
<tr>
<td>41–50%</td>
<td>1050</td>
<td>29</td>
<td>2.8</td>
<td></td>
<td>12</td>
<td>1.2</td>
</tr>
<tr>
<td>&gt;50%</td>
<td>7072</td>
<td>101</td>
<td>1.4</td>
<td></td>
<td>29</td>
<td>0.41</td>
</tr>
</tbody>
</table>

* % of SCA cases per LVEF class is presented.

a n=200 all SCA cases with echo data on LVEF.
b n=81 SCA cases, with echo taken between 1997–2000.
Risk Stratification Strategies

- Markers of abnormal **substrate** of structural heart disease
- Markers of abnormal **repolarization**
- Markers of abnormal **autonomic balance**
- **Inducibility** on Programmed Ventricular Stimulation
Implantable cardioverter defibrillator therapy activation for high risk patients with relatively well preserved left ventricular ejection fraction. Does it really work?

Konstantinos A. Gatzoulis a,*, Dimitris Tsiachris a, Polichronis Dilaveris a, Stefanos Archontakis a, Petros Arsenos a, Apostolis Vouliotis a, Skevos Sideris b, George Trantalis b, Efstatios Kartsagoulis a, Ioannis Kallikazaros b, Christodoulos Stefanadis a

a First Cardiology Department, University of Athens Medical School, Hippokration Hospital, Athens, Greece
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ABSTRACT

Background: Current guidelines for the primary prevention of sudden cardiac death have used a left ventricular ejection fraction (LVEF) ≤ 35% as a critical point to justify implantable cardioverter defibrillator (ICD) implantation in postmyocardial infarction patients and in those with nonischemic dilated cardiomyopathy. We compared mortality and ICD activation rates among different ICD group recipients using a cut-off value for LVEF ≤ 35%.

Methods: We followed up for a mean period of 41.1 months 495 ICD recipients (442 males, 65.6 years old, 68.9% post myocardial infarction patients, 422 with LVEF ≤ 35%). Prevention was considered primary in patients who fulfilled guidelines criteria or had inducible ventricular arrhythmia during programmed ventricular stimulation for patients with LVEF > 35%.

Results: Over the course of the trial, 84 of 495 patients died; 69 experienced cardiac death (6 sudden) and 15 non cardiac death. ICD recipients with LVEF ≤ 35% compared to those with preserved LVEF (mean LVEF = 43%) had a greater incidence of total mortality (18% vs. 11%, log rank p = 0.028) and cardiac death (15.4% vs. 5.5%, log rank p = 0.005). There was no difference in the incidence for appropriate device therapy between patients with LVEF ≤ 35% and those with LVEF > 35% (56.9% vs. 65.8%, log rank p = 0.93). In the multivariate analysis the presence of advanced New York Heart Association stage predicted both total mortality (HR = 2.69, 95% CI 1.771–4.086) and cardiac death (HR = 3.437, 95% CI 2.163–5.463).

Conclusions: ICD therapy may protect heart failure patients at early stages from arrhythmic morbidity and mortality, based on an electrophysiology-guided risk stratification approach.
Mortality – Cardiac Death – ICD activation – ICD shocks

K. Gatzoulis et al, IJC, 2013
SCD In Preserved LVEF

• 1041 post-MI with LVEF $\geq$40% (55 ± 10%)
• 32 ± 14 months F/U
• 18 SCD (1.8%)
• 18% (169 pts) with TWA, 12% (112 pts) with NSVT, 9% (81 pts) with LPs

*Ikeda et al, Predictive Value of Microvolt T-Wave Alternans for Sudden Cardiac Death in Patients With Preserved Cardiac Function After Acute Myocardial Infarction, J Am Coll Cardiol. 2006 Dec 5; 48(11):2268-74*
SCD In Preserved LVEF

Ikeda et al, Predictive Value of Microvolt T-Wave Alternans for Sudden Cardiac Death in Patients With Preserved Cardiac Function After Acute Myocardial Infarction, J Am Coll Cardiol. 2006 Dec 5; 48(11):2268-74

Figure 1. Kaplan-Meier event-free curves for serious arrhythmic events (i.e., sudden cardiac death, cardiac arrest, and resuscitated ventricular fibrillation) based on positive microvolt T-wave alternans (TWA) test (A), nonsustained ventricular tachycardia (NSVT) (B), and ventricular late potentials (LP) (C).
Ikeda et al, Predictive Value of Microvolt T-Wave Alternans for Sudden Cardiac Death in Patients With Preserved Cardiac Function After Acute Myocardial Infarction, J Am Coll Cardiol. 2006 Dec 5; 48(11):2268-74
SCD In Preserved LVEF

Figure 1. Kaplan-Meier event-free curves for serious arrhythmic events (i.e., sudden cardiac death, cardiac arrest, and resuscitated ventricular fibrillation) based on positive microvolt T-wave alternans (TWA) test (A), nonsustained ventricular tachycardia (NSVT) (B), and ventricular late potentials (LP) (C).

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Letters to the Editor

Prognostic value of programmed ventricular stimulation for sudden death in selected high-risk patients with structural heart disease and preserved systolic function

Konstantinos A. Gatzoulis a,*,1, Dimitris Tsiachris a,1, Petros Arsenos a,1, Stefanos Archontakis a,1, Polychronis Dilaveris a,1, Apostolis Vouliotis a,1, Skevos Sideris b,1, Ioannis Skiadas b,1, Ioannis Kallikazaros b,1, Christodoulos Stefanidis a,1

* First Cardiology Division, University of Athens Medical School, Hippokration Hospital, Athens, Greece
b State Department of Cardiology, Hippokration Hospital, Athens, Greece

69 post-MI patients, 42 DCM
(mean LVEF: 46±4.5%, males:96, age:65)

Symptoms
Syncope: 36
Presyncope: 26
Asymptomatic with NSVT: 49

PVS
Sustained VT 23/69 post MI
Sustained VT 8/42 DCM
Polymorphic VT 5/42 DCM

After 52.3 months follow up: ICD activation: 12/23 post MI, 8/10 DCM
Absence of SCD in non-inducible patients
Original Research

Post Myocardial Infarction Risk Stratification for Sudden Cardiac Death in Patients with Preserved Ejection Fraction: PRESERVE-EF Study Design

Konstantinos A. Gatzoulis¹, Dimitris Tsiachris¹, Petros Arsenos¹, Polychronis Dilaveris¹, Skevos Sideris², Emmanouil Simantirakis³, Michalis Efremidis², Nikolaos Dagres³, Panagiotis Korantzopoulos³, Nikolaos Fragakis⁷, Konstantinos Letsas⁴, Panagiota Flevari⁵, Vasilis Vasilikos⁷, Antonis Sideris⁴, Efstratios Iliodromitis⁵, Ioannis Goudevenos⁶, Ioannis Lekakis⁵, Panos Vardas³, Ioannis Kallikazaros², Christodoulos Stefanadis¹

¹First Cardiology Division, University of Athens, Hippokration Hospital, Athens. ²State Cardiology Department, Hippokration Hospital, Athens. ³Department of Cardiology, University Hospital of Heraklion, University of Crete. ⁴Second State Cardiology Department, Evangelismos Hospital, Athens. ⁵Second Cardiology Division, University of Athens, Attikon Hospital, Athens. ⁶Cardiology Division, University Hospital of Ioannina, University of Ioannina. ⁷Third Cardiology Division, Aristotle University Medical School, Hippokration Hospital, Thessaloniki, Greece

PRESERVE-EF is a multicenter, prospective, long-term observational cohort study (clinicaltrials.gov identifier NCT02124018) of post-MI revascularized patients with LVEF >40% at 40 days until 3 years after MI. The study is being conducted at 7 centers in

- >30 premature ventricular complexes (PVCs)/hour on 24-h Holter monitoring (HM)
- presence of non-sustained VT (NSVT) on HM
- 2/3 positive criteria for late potentials (LPs), either conventional or modified, obtained through the 45-min high-resolution digital ECG recording
- QTc derived from HM >440 ms (men) or >450 ms (women)
- Ambulatory T wave alternans (TWA) ≥65 μV
- SDNN <75 ms on the 24-h HM
- Deceleration capacity ≤4.5 ms and heart rate turbulence (HRT) onset ≥0% and HRT slope ≤2.5 ms
Conclusions:

8 out of 30 ICDs were activated during 18 months follow up.

1.12% of the total population.
5.3.1 Risk stratification

Risk stratification in patients with stable coronary artery disease after myocardial infarction with preserved ejection fraction

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Classa</th>
<th>Levelb</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVS should be considered in survivors of myocardial infarction with preserved LV function and otherwise unexplained syncope.</td>
<td>IIa</td>
<td>C</td>
<td>280–282</td>
</tr>
</tbody>
</table>

LV = left ventricular; PVS = programmed ventricular stimulation.

References:

Ventricular arrhythmogenic potential assessment in an asymptomatic ICH patient with normal EF

K. Gatzoulis et al., Hellen. J Cardiol 2017, in press
Ventricular arrhythmogenic potential assessment in an asymptomatic ICH patient with normal EF

K. Gatzoulis et al., Hellen. J Cardiol 2017, in press
Male 53 y.o
Inferior wall MI (x3) before 10 years
RCA PCI
NSVT in Stress Echo
DC+ L/Ps 3/3
LVEF=45%
NYHA I-II
Outcomes of Early Risk Stratification and Targeted Implantable Cardioverter-Defibrillator Implantation After ST-Elevation Myocardial Infarction Treated With Primary Percutaneous Coronary Intervention

Sarah Zaman, Gopal Sivagangabalan, Arun Narayan, Aravinda Thiagalingam, David L. Ross and Pramesh Kovoors
ΠΡΟΤΕΙΝΟΜΕΝΟ ΠΡΩΤΟΚΟΛΛΟ ΠΡΩΙΜΗΣ ΔΙΑΣΤΡΩΜΑΤΩΣΗΣ ΚΙΝΔΥΝΟΥ ΣΕ ΜΕΤΕΜΦΡΑΓΜΑΤΙΚΟΥΣ ΑΣΘΕΝΕΙΣ

ΑΞΙΟΛΟΓΗΣΗ ΠΡΟ ΤΟΥ ΕΞΙΤΗΡΙΟΥ ΚΛΑΣΜΑ ΕΞΩΘΗΣΗΣ ΑΡΙΣΤΕΡΑΣ ΚΟΙΛΙΑΣ

>40%: ΠΑΡΑΚΟΛΟΥΘΗΣΗ

≤40%: 24ΩΡΟ HOLTER ΚΑΙ ΣΥΜΨΗΦΙΣΤΙΚΟ ΚΑΡΔΙΟΓΡΑΦΗΜΑ

ΕΝΑΣ Η ΠΕΡΙΣΣΟΤΕΡΟΙ ΑΝΩΜΑΛΟΙ ΑΝΑΙΜΑΚΤΟΙ ΔΕΙΚΤΕΣ ΠΑΡΟΝΤΕΣ: ΗΛΕΚΤΡΟΦΥΣΙΟΛΟΓΙΚΟΣ ΕΛΕΓΧΟΣ

ΧΩΡΙΣ ΠΑΘΟΛΟΓΙΚΑ ΕΥΡΗΜΑΤΑ: ΠΑΡΑΚΟΛΟΥΘΗΣΗ

ΑΝ ΠΡΟΚΑΛΕΙΤΑΙ ΕΜΜΕΝΟΥΣΑ ΚΟΙΛΙΑΚΗ ΤΑΧΥΑΡΡΥΘΜΙΑ>ΠΡΩΙΜΗ ΕΜΦΥΤΕΥΣΗ ΑΠΙΝΙΔΩΤΟΥ

ΧΩΡΙΣ ΠΡΟΚΛΗΣΗ ΤΑΧΥΑΡΡΥΘΜΙΑΣ: ΠΑΡΑΚΟΛΟΥΘΗΣΗ

ΗΛΕΚΤΡΟΦΥΣΙΟΛΟΓΙΚΟ ΕΡΓΑΣΤΗΡΙΟ Α' ΚΑΡΔΙΟΛΟΓΙΚΗΣ ΚΛΙΝΙΚΗΣ ΠΑΝΕΠΙΣΤΗΜΙΟΥ ΑΘΗΝΩΝ ΚΑΙ ΚΡΑΤΙΚΗΣ ΚΑΡΔΙΟΛΟΓΙΚΗΣ ΚΛΙΝΙΚΗΣ ΙΓΝΑ
Primary Prevention of Sudden Cardiac Death in a Nonischemic Dilated Cardiomyopathy Population
Reappraisal of the Role of Programmed Ventricular Stimulation

Konstantinos A. Gatzoulis, MD; Apostolos-Ilias Vouliotis, MD; Dimitris Tsiachris, MD; Maria Salourou, MSc; Stefanos Archontakis, MD; Polychronis Dilaveris, MD; Theodoros Gialernios, MD; Petros Arsenos, MD; Georgios Karystinos, MD; Skevos Sideris, MD; Ioannis Kallikazaros, MD; Christodoulos Stefanadis, MD

Methods and Results—One hundred fifty-eight patients with idiopathic dilated cardiomyopathy underwent programmed ventricular stimulation. Ventricular tachycardia/ventricular fibrillation was triggered in 44 patients (group I, 27.8%) versus 114 patients (group II), where ventricular tachycardia/ventricular fibrillation was not induced. Sixty-nine patients with idiopathic dilated cardiomyopathy underwent implantable cardioverter-defibrillator (ICD) implantation: 41/44 in group I and 28/114 in group II. The major end points of the study were overall mortality and appropriate ICD activation. Overall mortality during the 46.9 months of mean follow-up was not significantly different between the 2 groups. Patients with left ventricular ejection fraction ≤35% (n=119) demonstrated a higher overall mortality rate compared with the patients with left ventricular ejection fraction >35% (n=39; 16.8% versus 10.3%, log-rank $P=0.025$). Advanced NYHA class (III and IV versus I and II) was the single independent and strongest prognostic factor of overall mortality (hazard ratio, 11.909; $P<0.001$; confidence interval, 3.106–45.65), as well as of cardiac mortality (hazard ratio, 14.787; $P=0.001$; confidence interval, 2.958–73.922). Among ICD recipients, ICD activation rate was significantly higher in group I compared with group II (30 of 41 patients–73.2% versus 5 of 28 patients–17.9%; log-rank $P=0.001$), either in the form of antitachycardia pacing (68.3% versus 17.9%; log-rank $P=0.001$) or in the shock delivery form (51.2% versus 17.9%; log-rank $P=0.05$). Induction of ventricular tachycardia/ventricular fibrillation during programmed ventricular stimulation in contrast to left ventricular ejection fraction was the single independent prognostic factor for future ICD activation (hazard ratio, 4.195; $P=0.007$; confidence interval, 1.467–11.994).
Overall population assessed for eligibility: 191 patients.

Excluded: 6 patients with aborted SCD or spontaneous sustained VT/VF, 9 patients with NYHA stage IV HF.

Allocated for PVS: 176 patients.

Refused PVS: 3 patients.

Underwent PVS: 173 patients.

Lost to follow-up: 15 patients.

Analysed: 158 patients.

EF >35%: 39 patients:

Positive PVS: 10 patients
  ICD implanted: 9
  Events: 6 ICD activation
  1 HF death
  1 non-CD

Negative PVS: 29 patients
  ICD not implanted: 1
  Events: none

EF ≤35%: 119 patients:

Positive PVS: 34 patients
  ICD implanted: 32
  Events: 24 ICD activation
  7 HF death
  3 SCD
  1 non-CD

Negative PVS: 85 patients
  ICD not implanted: 2
  Events: none

SCD denotes sudden cardiac death; HF heart failure; PVS programmed ventricular stimulation; ICD implantable cardioverter-defibrillator; CD cardiac death.
Primary Prevention of Sudden Cardiac Death in a Nonischemic Dilated Cardiomyopathy Population
Reappraisal of the Role of Programmed Ventricular Stimulation

A. ICD activation in ICD recipients

B. Sudden cardiac death surrogate

PVS

-- negative
-- positive

\( p < 0.001 \)

Circ Arrhythm Electrophysiol. 2013;6:00-00
Primary Prevention of Sudden Cardiac Death in a Nonischemic Dilated Cardiomyopathy Population
Reappraisal of the Role of Programmed Ventricular Stimulation

Death from any cause

![Graph showing survival probabilities and LVEF status](image_url)

- LVEF ≤ 35%
- LVEF > 35%

**p = 0.025**

Circ Arrhythm Electrophysiol. 2013;6:00-00
Male 69 y.o
Sinus bradycardia at 48 bpm
PVCs (8000/24h)
NSVT
L/Ps : 3/3
LVEF= 40-45%
Normal CORO
AICD DDDR

ICD activation 3 years with ATP

Follow up 11 years with 7 activations (2 for VFL)

CHF and Ca death at age 81 years old
Genetics and DCMP

Phospholamban
Lamin A and C  **HIGH RISK FOR SCD**
NCLVCM
14 y/o male patient with HOCM

K.Gatzoulis, J.Gialafos, HJC 2003
ΔΙΑΣΤΡΩΜΑΤΩΣΗ ΚΙΝΔΥΝΟΥ ΣΤΗΝ ΗCM – ΟΙ ΚΑΤΕΥΘΥΝΤΗΡΙΕΣ ΟΔΗΓΙΕΣ

ΑΞΙΟΣΗΜΕΙΩΤΟ ΟΤΙ ΚΑΤ’ ΟΥΣΙΑΝ ΟΙ ΚΛΙΝΙΚΟΙ ΠΑΡΑΓΟΝΤΕΣ ΔΙΑΚΡΙΝΟΝΤΑΙ ΣΕ ΔΥΟ ΚΑΤΗΓΟΡΙΕΣ ΤΟΥΣ ΙΣΧΥΟΥΣ (ΟΙΚΟΓΕΝΕΙΑΚΟ ΙΣΤΟΡΙΚΟ ΑΙΦΝΙΔΙΟΥ ΘΑΝΑΤΟΥ, ΑΝΕΞΗΓΗΤΗ ΣΥΓΚΟΠΗ ΚΑΙ ΕΚΣΕΣΗΜΑΣΜΕΝΗ ΥΠΕΡΤΡΟΦΙΑ), ΟΙ ΟΠΟΙΟΙ ΔΥΝΑΝΤΑΙ ΜΟΝΙ ΤΟΥΣ ΝΑ ΠΥΡΟΔΟΤΗΣΟΥΝ ΤΗΝ ΑΠΟΦΑΣΗ ΓΙΑ ΕΜΦΥΤΕΥΣΗ ΚΑΙ ΤΟΥΣ ΑΣΘΕΝΕΙΣ (nsVT ΚΑΙ ΑΝΟΜΑΛΗ ΑΠΟΚΡΙΣΗ ΤΗΣ ΠΙΕΣΗΣ ΣΤΗΝ ΑΣΚΗΣΗ) ΠΟΥ ΑΠΑΙΤΟΥΝ ΚΑΙ ΤΗΝ ΠΑΡΟΥΣΙΑ ΕΝΟΣ ΤΡΟΠΟΠΟΙΗΤΗ ΓΙΑ ΝΑ ΟΔΗΓΗΣΟΥΝ ΣΕ ΕΜΦΥΤΕΥΣΗ

ΕΠΙΣΗΣ, ΔΕΝ ΣΥΝΙΣΤΑΤΑΙ Η ΕΜΦΥΤΕΥΣΗ ΕΠΙ ΤΗ ΒΑΣΕΙ ΓΟΝΟΤΥΠΟΥ ΚΑΙ ΜΟΝΩΝ, ΧΩΡΙΣ ΝΑ ΥΠΑΡΧΟΥΝ ΚΛΙΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ ΤΗΣ ΝΟΣΟΥ
ΔΙΑΣΤΡΩΜΑΤΩΣΗ ΚΙΝΔΥΝΟΥ ΣΤΗΝ HCM – ΟΙ ΚΑΤΕΥΘΥΝΤΗΡΙΕΣ ΟΔΗΓΙΕΣ

**PRIMARY PREVENTION**

**Recommended assessment:**
- History
- 2D/Doppler echocardiogram
- 48-hour ambulatory ECG

**HCM Risk-SCD variables:**
- Age
- Family history of sudden cardiac death
- Unexplained syncope
- Left ventricular outflow gradient
- Maximum left ventricular wall thickness
- Left atrial diameter
- NSVT

**HCM Risk-SCD Score**

- **LOW RISK**
  - 5-year risk <4%
  - ICD generally not indicated

- **INTERMEDIATE RISK**
  - 5-year risk >4-<6%
  - ICD may be considered

- **HIGH RISK**
  - 5-year risk ≥6%
  - ICD should be considered
ΔΙΑΣΤΡΩΜΑΤΩΣΗ ΚΙΝΔΥΝΟΥ ΣΤΗΝ ΗCM – ΕΝΑΛΛΑΚΤΙΚΕΣ ΠΡΟΣΕΓΓΙΣΕΙΣ – MRI
Η ΦΕ ΚΑΙ ΕΚΒΑΣΗ

- \( p(X^2) = 4.05 \times 10^{-7} \)
- Ο ΜΟΝΑΔΙΚΟΣ ΑΣΘΕΝΗΣ ΣΤΟΝ ΟΠΟΙΟΝ ΕΠΗΛΘΕ ΤΟ ΠΚΣ ΜΕ ΑΡΝΗΤΙΚΟ ΗΦΕ ΑΠΕΒΙΩΣΕ ΑΙΦΝΙΔΙΩΣ ΚΑΤΑ ΤΗΝ ΒΑΔΙΣΗ ΚΑΙ ΣΤΗΝ ΝΕΚΡΟΤΟΜΗ ΑΝΕΦΕΡΘΗ ΠΑΡΟΥΣΙΑ ΒΑΡΕΙΑΣ ΕΚΤΕΤΑΜΕΝΗΣ ΣΤΕΦΑΝΙΑΙΑΣ ΝΟΣΟΥ, ΧΩΡΙΣ ΕΠΙΣΗΜΗ ΔΙΑΓΝΩΣΗ ΟΞΕΩΣ ΣΤΕΦΑΝΙΑΙΟΥ ΣΥΝΔΡΟΜΟΥ – ΙΣΩΣ ΝΑ ΚΙΝΗΤΟΠΟΙΗΘΗΚΕ ΚΟΙΛΙΑΚΗ ΑΡΡΥΘΜΙΟΓΕΝΕΣΙΑ ΑΠΟ ΜΙΚΡΟΙΣΧΑΙΜΙΚΟ ΕΠΕΙΣΟΔΙΟ;

Η ΔΙΑΦΟΡΑ ΠΑΡΕΜΕΙΝΕ ΣΤΑΤΙΣΤΙΚΩΣ ΣΗΜΑΝΤΙΚΗ ΚΑΙ ΜΕΤΑ ΤΗΝ ΣΤΑΔΙΟΠΟΙΗΣΗ ΚΑΤΑ EUROSCORE Ή ΚΛΑΣΣΙΚΟΥΣ ΠΑΡΑΓΟΝΤΕΣ ΚΙΝΔΥΝΟΥ (≤1 ΕΝΑΝΤΙ ≥2) ΕΝΕΡΓΗΣΕ ΣΕ ΠΡΟΚΛΗΣΕΙΣ ΕΚΒΑΣΗ ΑΠΟ ΜΙΚΡΟΙΣΧΑΙΜΙΚΗ ΕΠΕΙΣΩΔΗ.
### ΑΠΟΤΕΛΕΣΜΑΤΑ ΜΕΛΕΤΗΣ
### ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ ΗΦΕ

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<td>66.7%</td>
<td>66.7%</td>
<td>100%</td>
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ΑΠΟΤΕΛΕΣΜΑΤΑ ΜΕΛΕΤΗΣ
PATIENTS (ischemic or dilated cardiomyopathy)

Left ventricular EF assessment

- <35%
  - Competing mortality
    - High
      - ≤1 year survival expectancy
        - Nothing
          - <3 NIRF
            - Negative PVS
              - Observe and Follow-up
            - Positive PVS
              - ICD
    - Low
      - >1 year survival expectancy
        - NIRF
          - <3
            - Negative PVS
              - Observe and Follow-up
          - ≥3
            - Positive PVS
              - ICD
  - ≥35%
  - Imaging
    - Significant fibrosis
      - No
        - None
      - Yes
        - ≥1
          - Negative PVS
            - Observe and Follow-up
          - Positive PVS
            - ICD

Gatzoulis K., Sideris A., Kanoupakis E., Sideris S...Koletis T. ANEC 2017
Σήραγγα εκτροπής, Αχελώος 1960
Κ. Μπαλάφας