The time is ripe for S-ICD to replace the transvenous ICD ?

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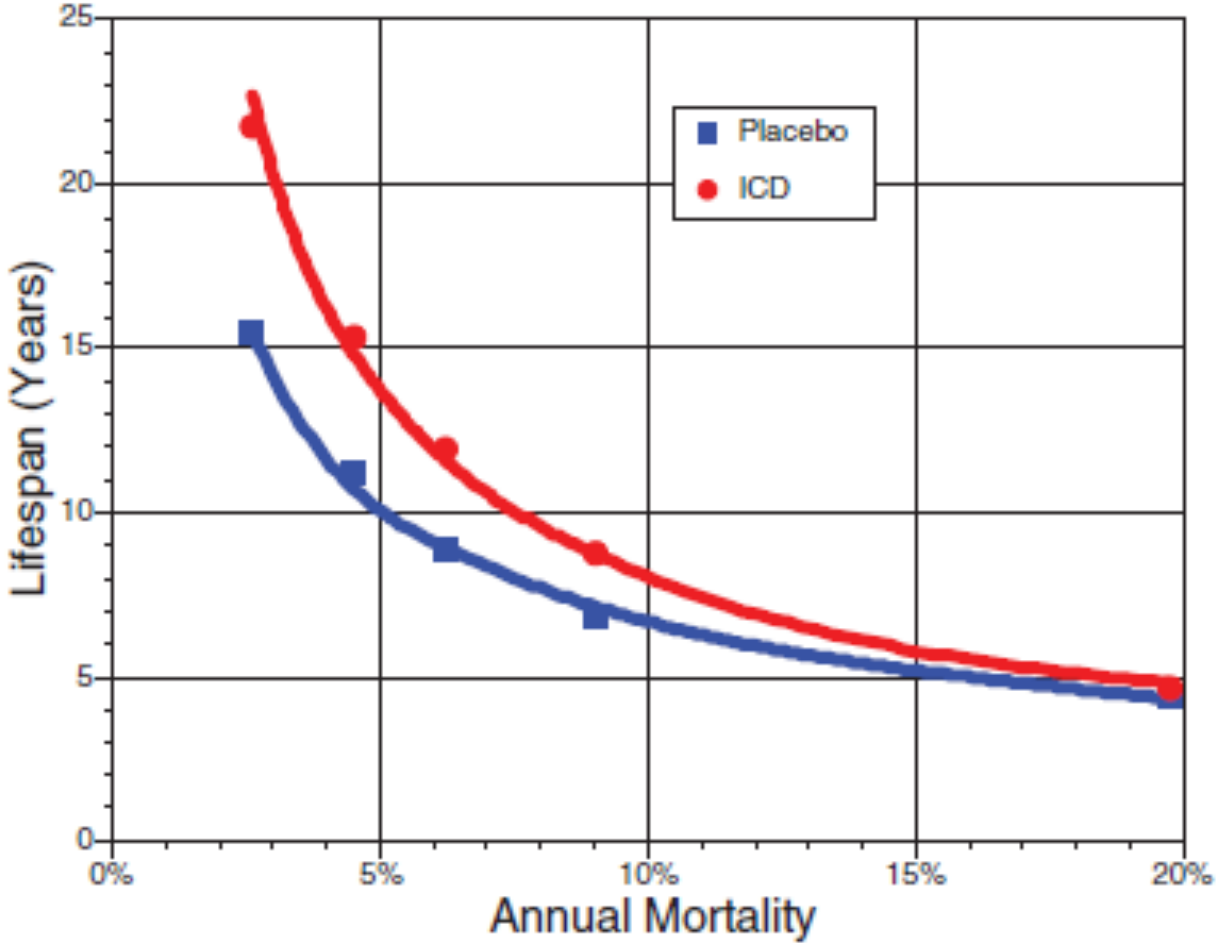
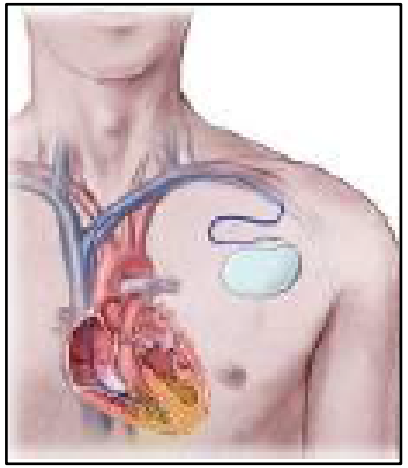
Bologna

Life-expectancy gain by ICD therapy in non-severe (NYHA 4) HF patients



Circulation. 2009;120:835–842.

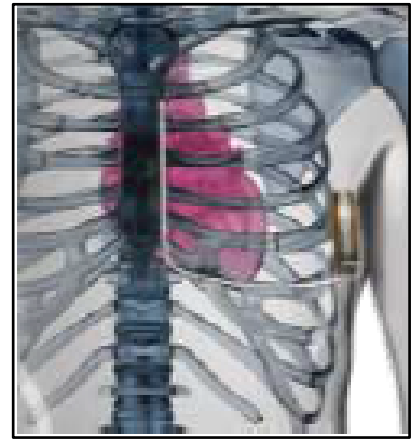
DOES it Matter how you save one life?



כָּל הַמַּצִּיל נֶפֶשׁ אַחַת מִיִּשְׂרָאֵל,
כְּאִילּוּ הִצִּיל עוֹלָם מָלֵא.

Kol hamatzil nefesh achât mi'Yisra'êl,
ke'ilu hitsil olâm malê.

Whoever saves a single life is as if
he had saved an entire universe.



Face to face

Favours S-ICD	***Favours TV-ICD***
• Spares vascular access	• Smaller device size
• NO intravascular complications	• Longer longevity
• Endovascular infection unlikely, NO life threatening extraction	• Better sensing and noise discrimination
• Fewer LEAD complications	• ATP, brady pacing

What is your preference ?

Raise your hands..

Transvenous SC ICD

Subcutaneous ICD

2015 ESC Guidelines

Subcutaneous implantable cardioverter defibrillator

Recommendations	Class[a]	Level[b]	Ref.[c]
Subcutaneous defibrillators should be considered as an alternative to transvenous defibrillators in patients with an indication for an ICD when pacing therapy for bradycardia support, cardiac resynchronization or antitachycardia pacing is not needed.	IIa	C	157, 158
The subcutaneous ICD may be considered as a useful alternative to the transvenous ICD system when venous access is difficult, after the removal of a transvenous ICD for infections or in young patients with a long-term need for ICD therapy.	IIb	C	This panel of experts

ICD = implantable cardioverter defibrillator.
[a]Class of recommendation.
[b]Level of evidence.
[c]Reference(s) supporting recommendations.

2017 AHA/ACC Guidelines

Recommendations for Subcutaneous Implantable Cardioverter-Defibrillator

References that support the recommendations are summarized in Online Data Supplement 55.

COR	LOE	Recommendations
I	B-NR	1. n patients who meet criteria for an ICD who have inadequate vascular access or are at high risk for infection, and in whom pacing for bradycardia or VT termination or as part of CRT is neither needed nor anticipated, a subcutaneous implantable cardioverter-defibrillator is recommended (1-5).
IIa	B-NR	2. In patients who meet indication for an ICD, implantation of a subcutaneous implantable cardioverter-defibrillator is reasonable if pacing for bradycardia or VT termination or as part of CRT is neither needed nor anticipated (1-4).
III: Harm	B-NR	3. In patients with an indication for bradycardia pacing or CRT, or for whom antitachycardia pacing for VT termination is required, a subcutaneous implantable cardioverter-defibrillator should not be implanted (1-4, 6-8).

S-ICD:

- Young
- No need for ATP/pacing
- High infection risk

Individualized approach

- **Age**
- **Infection risk**
- **Lead issues**
- **Need for ATP**
- **Need for pacing**
- **Etiology**
- **Indication**
- **Disease progression**
- **(Costs)**

What does your patient need?

- Treatment of sudden death

Shock BOX

- Treatment of sudden death, + treatment of ventricular tachyarrhythmias, + …… ?

Shock BOX + ATP + ……

Is this a case for:

Less is More

Ludwig Mies van der Rohe

Or is it simply

LESS ?

Primary and secondary prevention

Main findings:

1) patients treated for secondary prevention experienced appropriate therapy more often;
2) the long-term risk for all-cause mortality was comparable for both groups;
3) risk for subsequent VA was higher in primary prevention patients than in secondary prevention patients;
4) no differences were demonstrated in the incidence of inappropriate shocks.

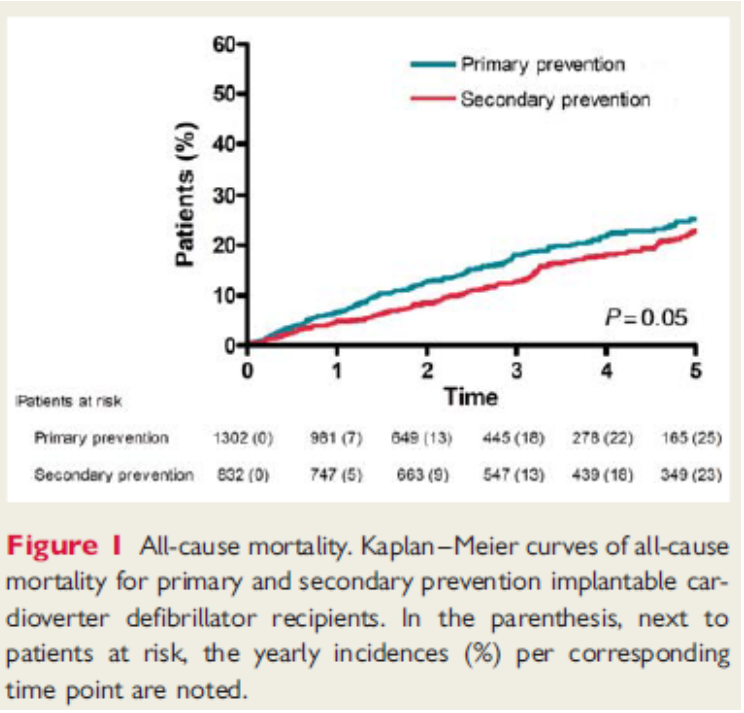


Figure 1 All-cause mortality. Kaplan–Meier curves of all-cause mortality for primary and secondary prevention implantable cardioverter defibrillator recipients. In the parenthesis, next to patients at risk, the yearly incidences (%) per corresponding time point are noted.

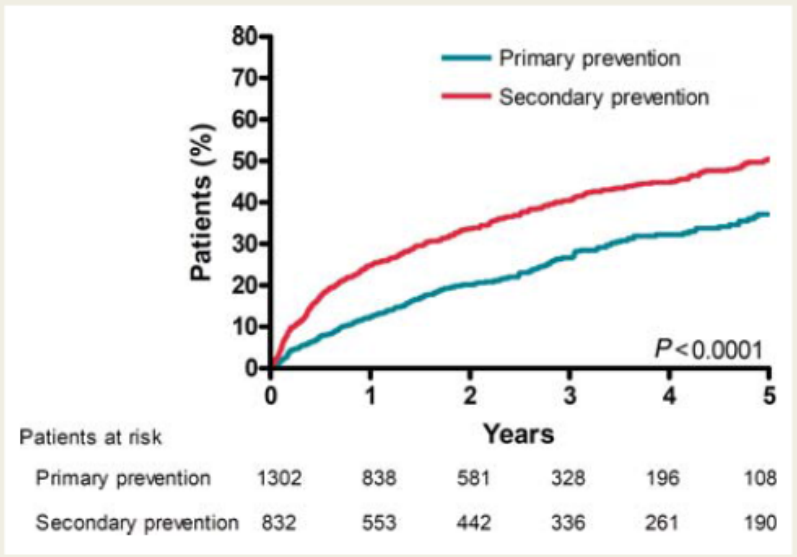


Figure 2 Appropriate therapy. Kaplan–Meier curves of appropriate therapy for primary and secondary prevention implantable cardioverter defibrillator recipients.

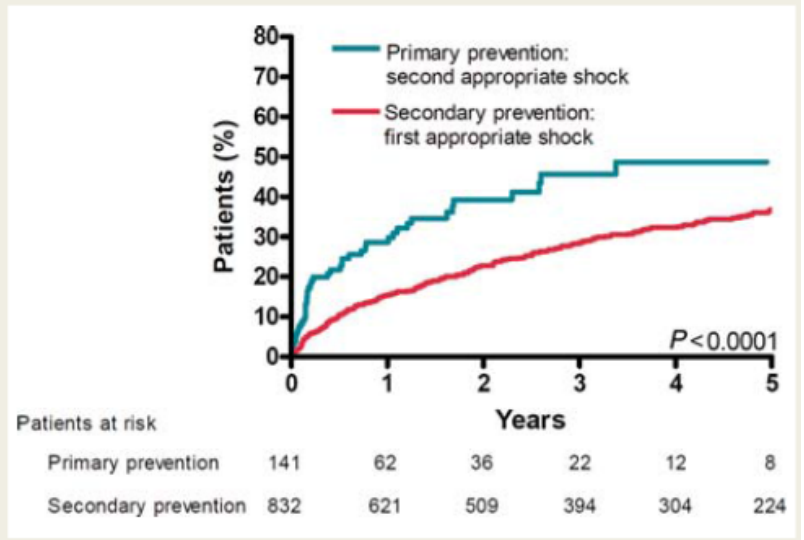


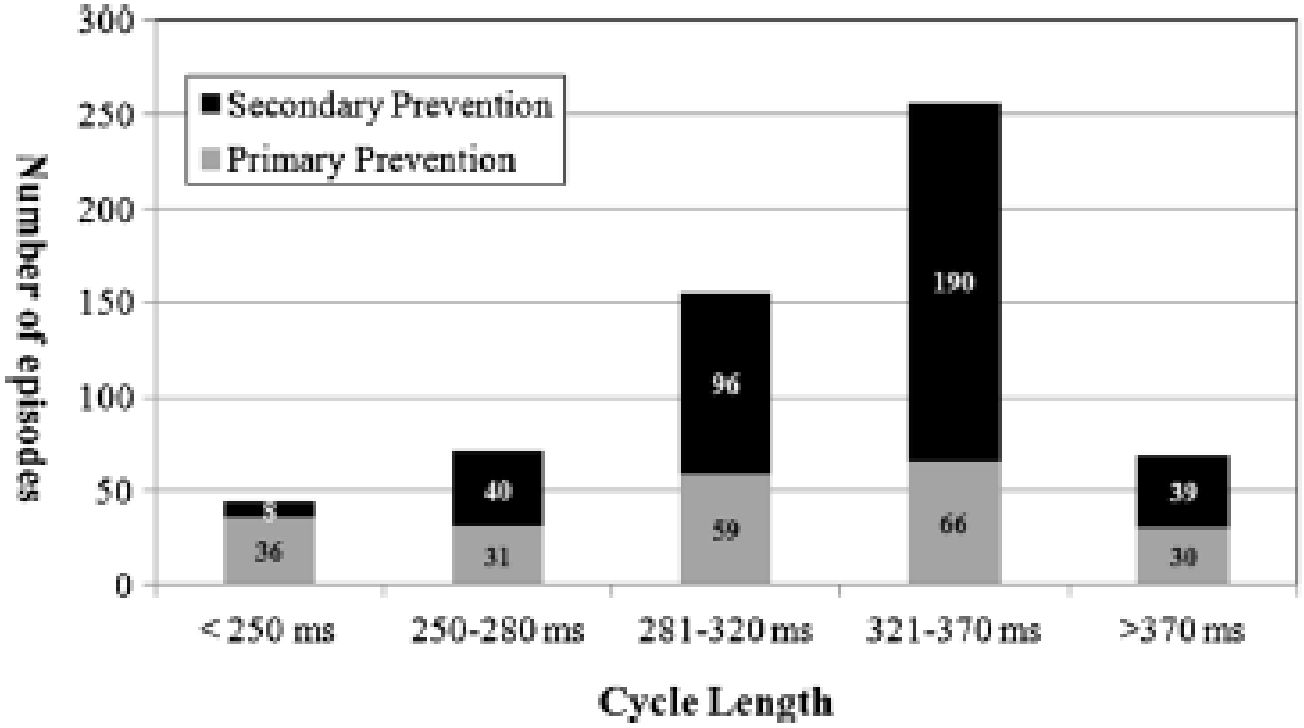
Figure 4 Subsequent risk for appropriate shock. Kaplan–Meier curves of appropriate shock for the second appropriate shock in primary prevention implantable cardioverter defibrillator recipients and the first appropriate shock in secondary prevention implantable cardioverter defibrillator recipients.

Conclusion

During long-term follow-up, compared with secondary prevention ICD patients, primary prevention ICD recipients exhibited a lower risk of VA, which triggered appropriate ICD therapy but demonstrated comparable mortality rates. Both groups showed a similar occurrence of inappropriate shocks.

van Welsenes H et al. Europace 2011; 11: 389-394

Primary and secondary prevention: Arrhythmias cycle length



- Prevalence of VT & VF episodes higher in SP
- SP pts tend to recurr with the same arrhythmia
- VTs occurring in SP terminate less frequently with ATP
- SP patients seem to have fewer self-terminating VTs

Jimenez-Candil J et al. J Interv Card Electrophysiol 2015; 44: 187-195

Arrhythmias:

Ischemic vs Non-ischemic Etiology… it's not enough !!

Primary endpoint: occurrence of any appropriate ICD therapy

	Ischemic Etiology, n = 53	Nonischemic Etiology, n = 43
LGE positive	51 (95.7)	38 (77.6)
Ischemic pattern	48 (90.5)	1 (2.3)
Nonischemic pattern	3 (5.7)	31 (81.6)
Cx-LGE	21 (39.6)	11 (25.6)
Subtype 1[a]	16 (34.0)	0 (0.0)
Subtype 2[b]	0 (0.0)	6 (11.3)
Subtype 3[c]	0 (0.0)	4 (7.5)
Subtype 4[d]	5 (9.4)	3 (7.0)

Abbreviations: Cx-LGE, complex late gadolinium enhancement; LGE, late gadolinium enhancement. Data are presented as n (%). ≥1 pattern can coexist in the same patient; patterns are calculated for LGE-positive patients and Cx-LGE for overall patients.

LGE was defined as "complex" (Cx-LGE) in presence of ≥1 of the following:

- ischemic pattern, involving ≥2 different coronary territories (subtype 1);
- epicardial pattern (subtype 2);
- global endocardial pattern (subtype 3);
- presence of ≥2 different patterns (subtype 4).

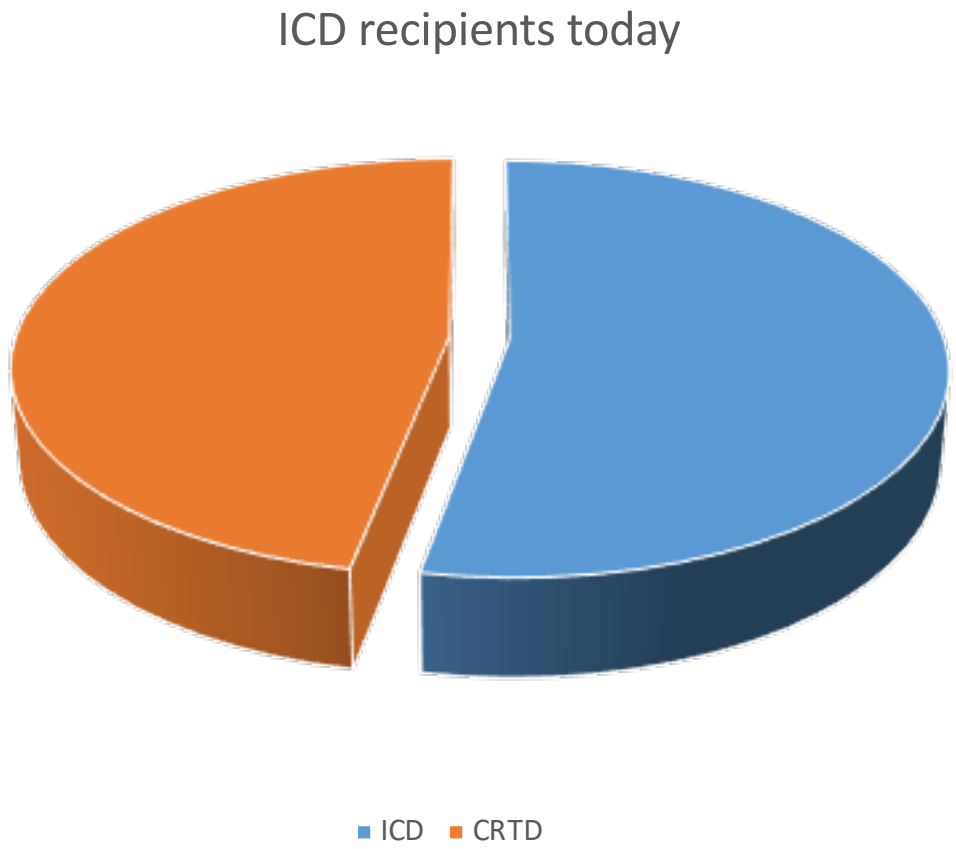
	Sustained VA Requiring ICD Therapy					
	Univariate			Multivariate		
Variables	HR	95% CI	P Value	HR	95% CI	P Value
Sex	1.43	0.59–3.50	0.425	–	–	–
NYHA class III/IV	0.68	0.33–1.39	0.293	–	–	–
Secondary prevention	1.22	0.43–3.49	0.711	–	–	–
AF	0.65	0.16–2.70	0.553	–	–	–
LBBB	0.46	0.22–0.97	0.041	0.68	0.31–1.52	0.348
MR grade 3–4	1.00	0.45–2.23	1.00	–	–	–
LVEF-CMR (10% step)	1.04	0.65–1.67	0.862	–	–	–
LVEDV-CMR (10-mL step)	1.03	0.98–1.08	0.216	–	–	–
RVEF-CMR (10% step)	0.90	0.71–1.13	0.365	–	–	–
RVEDV-CMR (10-mL step)	1.07	1.01–1.14	0.034	1.06	1.00–1.12	0.045
LV aneurysm	1.02	0.46–2.29	0.956	–	–	–
LGE positivity	5.79	0.80–42.14	0.084	–	–	–
Ischemic LGE	1.18	0.58–2.43	0.651	–	–	–
Cx-LGE	3.27	1.59–6.74	0.001	3.22	1.56–6.65	0.002

Abbreviations: AF, atrial fibrillation; CI, confidence interval; CMR, cardiovascular magnetic resonance; Cx-LGE, complex late gadolinium enhancement; HR, hazard ratio; ICD, implantable cardioverter-defibrillator; LBBB, left bundle branch block; LGE, late gadolinium enhancement; LV, left ventricular; LVEDV-CMR, left ventricular end-diastolic volume measured with CMR; LVEF-CMR, left ventricular ejection fraction measured with CMR; MR, mitral regurgitation; NYHA, New York Heart Association; RVEDV-CMR, right ventricular end-diastolic volume measured with CMR; RVEF-CMR, right ventricular ejection fraction measured with CMR; VA, ventricular arrhythmia.

Pedretti S et al. Clin Cardiol 2018; 41: 494-501

Points of discussion

- Age
- Infection risk
- Lead issues
- Need for ATP
- Need for pacing
- Etiolo
- Indicat
- Arrhythmic potential
- (Costs)



Factors influencing the use of subcutaneous or transvenous ICD: EHRA Survey

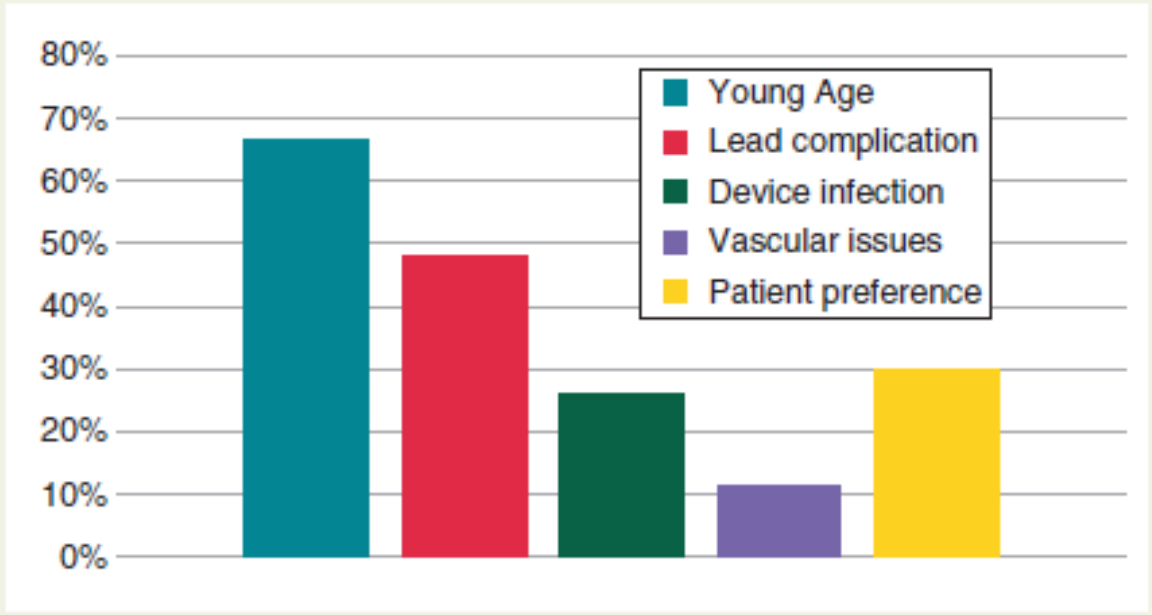


Figure 2 Factors in favour of S-ICD implantation (multiple answers). Each bar represents one possible answer (proportion of responders to each question). S-ICD, subcutaneous implantable cardioverter-defibrillator.

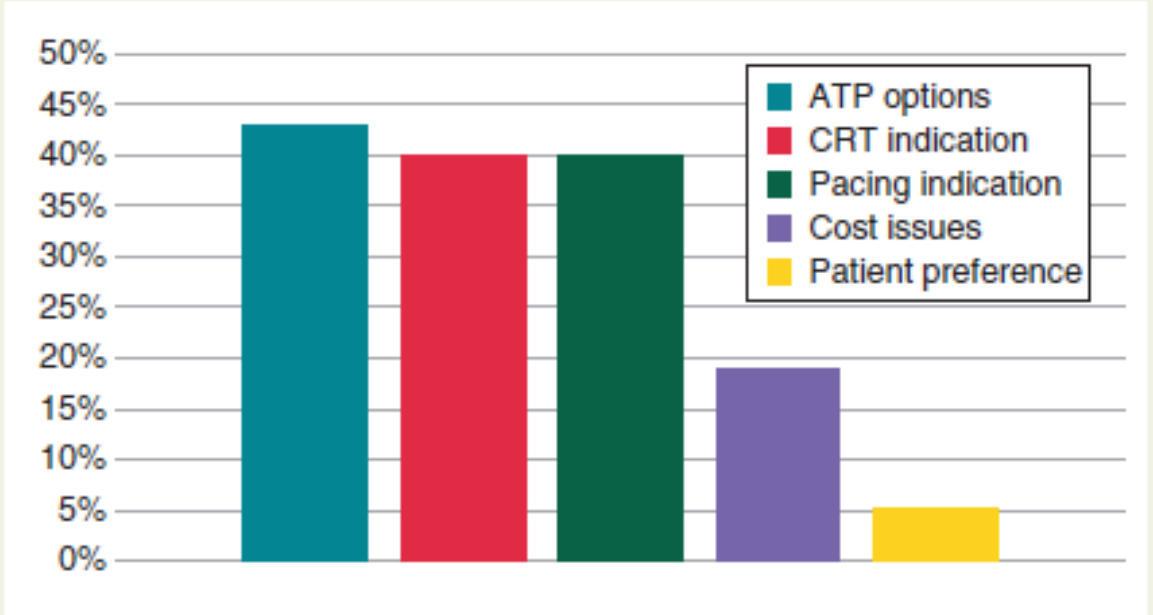


Figure 3 Factors in favour of a transvenous ICD implantation (multiple answers). Each bar represents one possible answer (proportion of responders to each question). ICD, implantable cardioverter-defibrillator.

Boveda S et al. Europace 2018; 20: 887-892

SICD: why and why not?

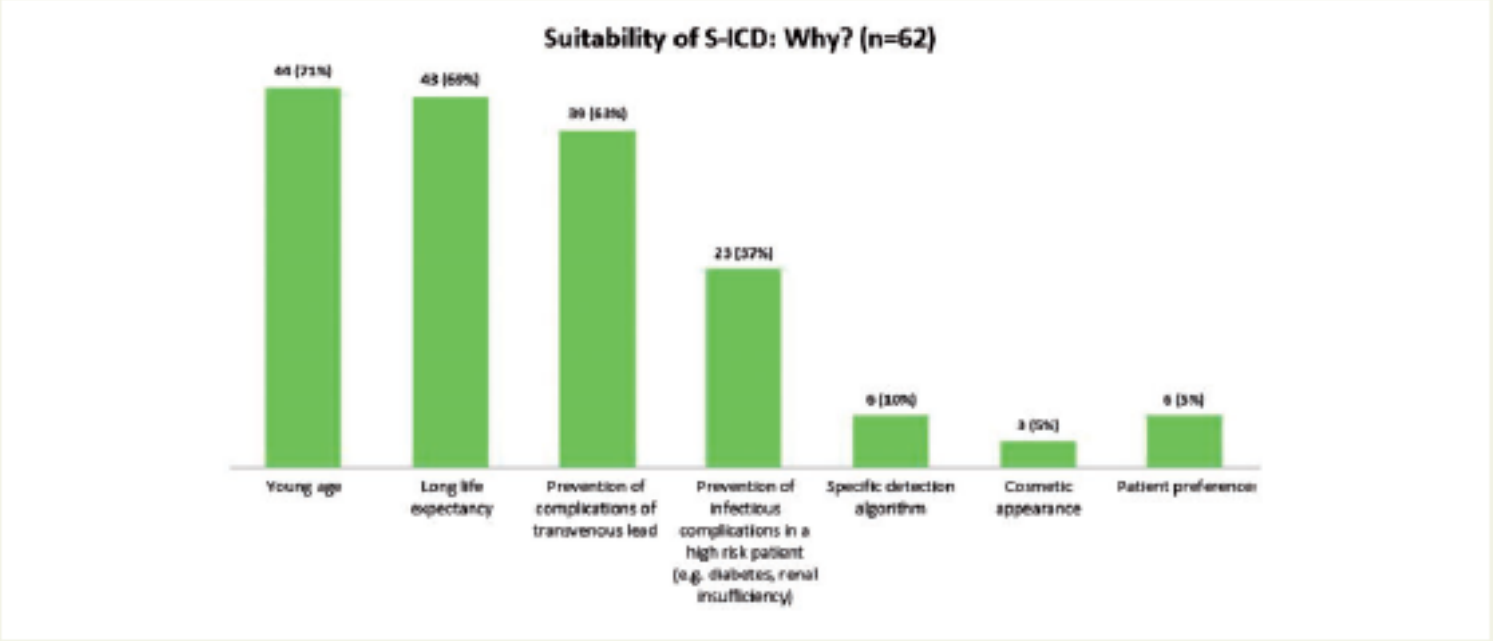


Figure 3 Factors for preferring an S-ICD over a transvenous ICD ($n = 62$). Multiple factors were reported per patient.

AIAC Survey

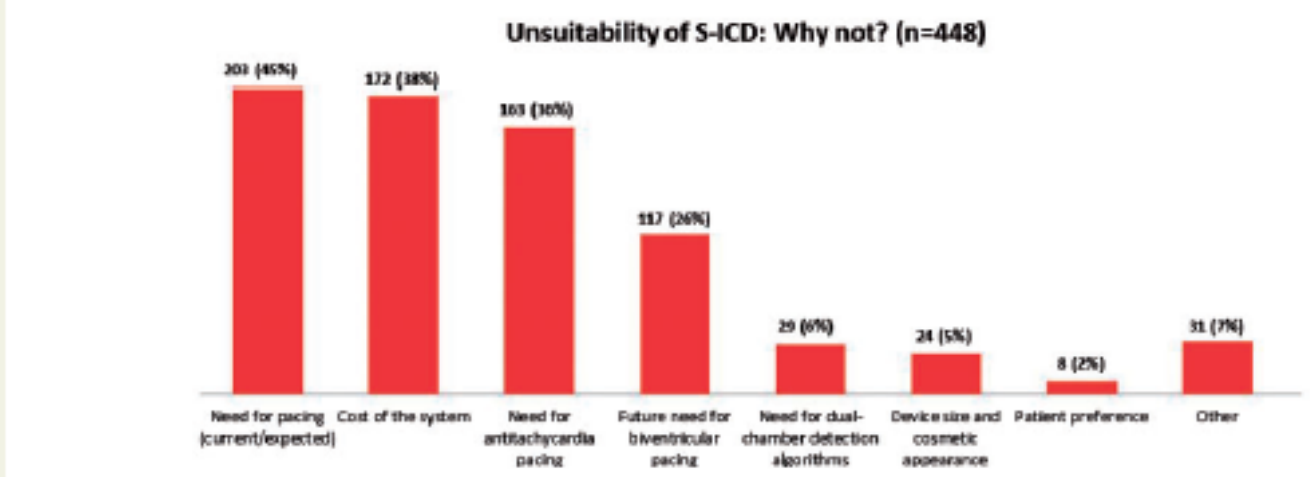


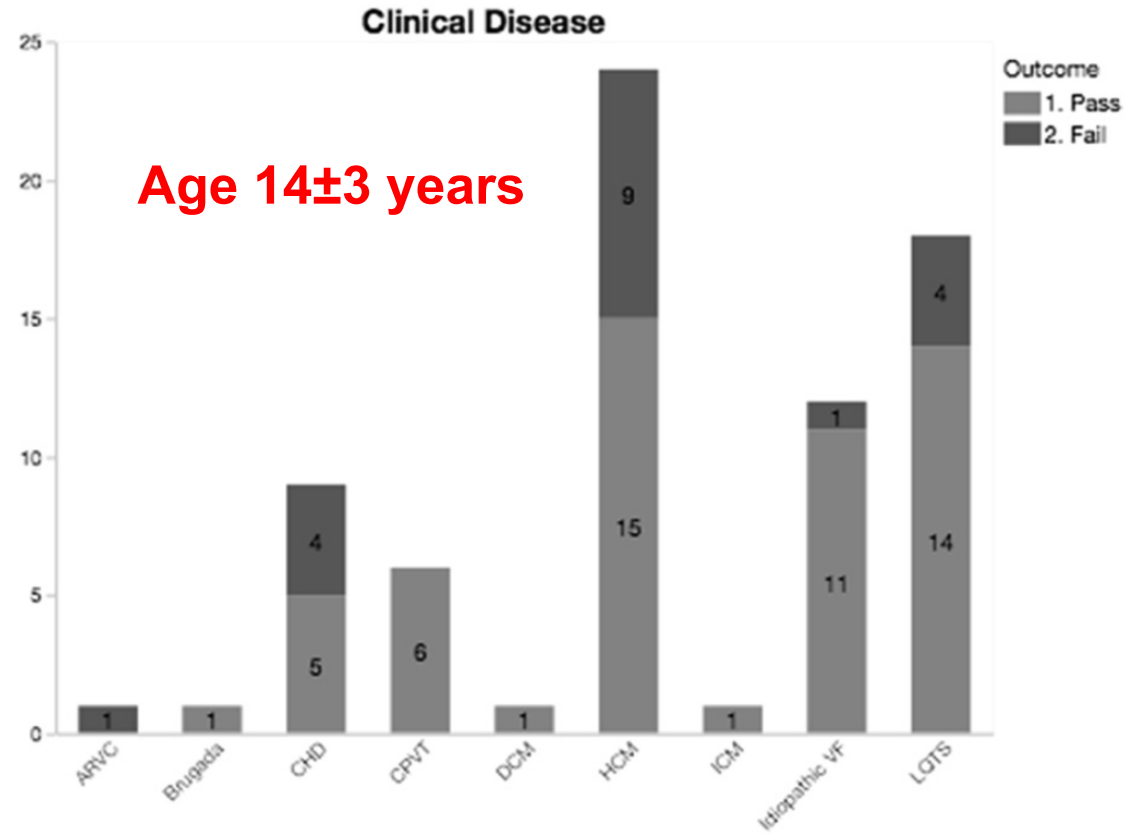
Figure 2 Factors for preferring a transvenous ICD over an S-ICD ($n = 448$). Multiple factors were reported per patient.

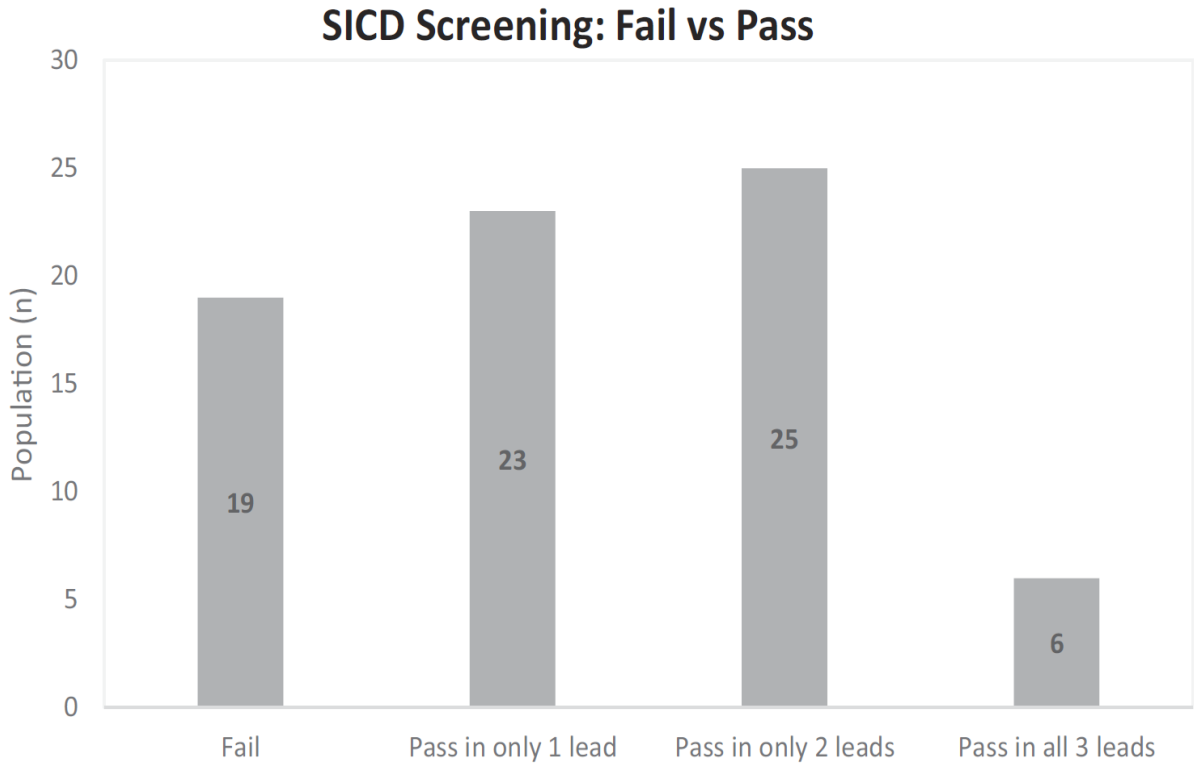
Botto GL et al. Europace 2017; 19:1826-32

Predictors of electrocardiographic screening failure for the subcutaneous implantable cardioverter-defibrillator in children: A prospective multicenter study

Matthew Campbell, MD,* Jeremy P. Moore, MD, MS,† Narayanswami Sreeram, MD, PhD,‡ Johannes C. von Alvensleben, MD,§ Anjan Shah, MD,‖ Anjan Batra, MD,¶ Ian Law, MD,# Shubhayan Sanatani, MD, FRCPC, FHRS,** Vincent Thomas, MD,†† Farnoosh Nik-Ahd, BS, BA,† Stephen Williams, MD,‖ Nina Nosavan, MD,¶ Jennifer Maldonado, BS,# Amelia Hart, RCT,** Thuan Nguyen, MD, MS, PhD,* Seshadri Balaji, MBBS, FRCP, PhD*

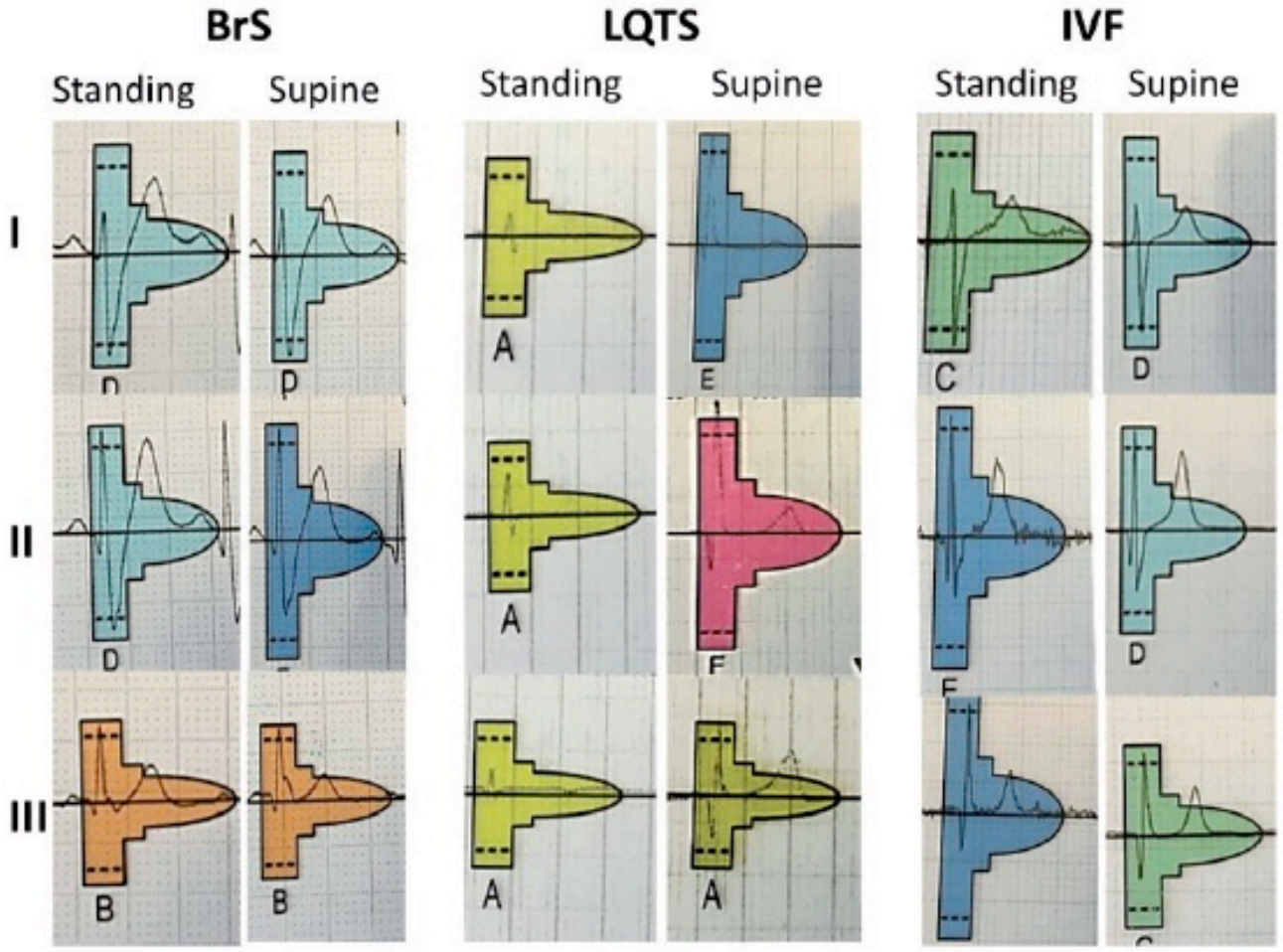
Heart Rhythm 2018, In Press





Variable	Exp β	Odds ratio	Pr>ChiSq
QTc interval (>440 ms)	1.60	5.0	.016
QRS duration (>120 ms)	2.20	8.6	.016
R:T ratio in lead aVF (<6.5)	2.42	11.3	.017

High rate of subcutaneous implantable cardioverter-defibrillator sensing screening failure in patients with Brugada syndrome: a comparison with other inherited primary arrhythmia syndromes



S-ICD screening failure occurs in up to 13% of patients with inherited primary arrhythmia syndromes.

Patients with BrS present the highest rate of screening failure as compared with other cardiac channelopathies.

Conte G et al. Europace 2017; in press

Europace (2017) **0**, 1–6
doi:10.1093/europace/eux009

18% Screening Failure in Brugada patients amongst other primary arrhythmia syndromes

Table 1 Clinical, ECG, and S-ICD screening characteristics of patients with BrS and patients with other inherited primary arrhythmias syndromes

	BrS ($n = 61$)	LQTS/IVF/ERS ($n = 39$)	*P* value
Age (years)	42.5 ± 15.3	44.0 ± 18.2	0.46
Male gender, *n* (%)	50 (82%)	22 (56%)	**0.007**
BMI (kg/m^2)	23.8	22.7	0.84
Aborted SD, *n* (%)	9 (14.7%)	24 (61.5%)	**<0.001**
Syncope, *n* (%)	13 (21.3%)	8 (20.5%)	1.0
Family history of SD, *n* (%)	20 (32%)	7 (17%)	0.11
Inducible at EPS, *n* (%)	7 (11.4%)	–	–
Spontaneous type 1 ECG, *n* (%)	34 (55.7%)	–	–
AV conduction disturbances, *n* (%)	22 (36.0)	14 (35.8%)	1.00
S-ICD screening failure rate (%)	11 (18%)	2 (5%)	0.07
Absolute number of appropriate vectors, *n* (%)	786 (49.6%)	595 (84.7%)	**<0.001**
Mean number of appropriate vectors per patient, *n*	1.5 ± 0.9	2.0 ± 0.9	0.72

Patients want an infection-free life & longer lasting devices

73% of patients are concerned about battery life and device longevity[1]

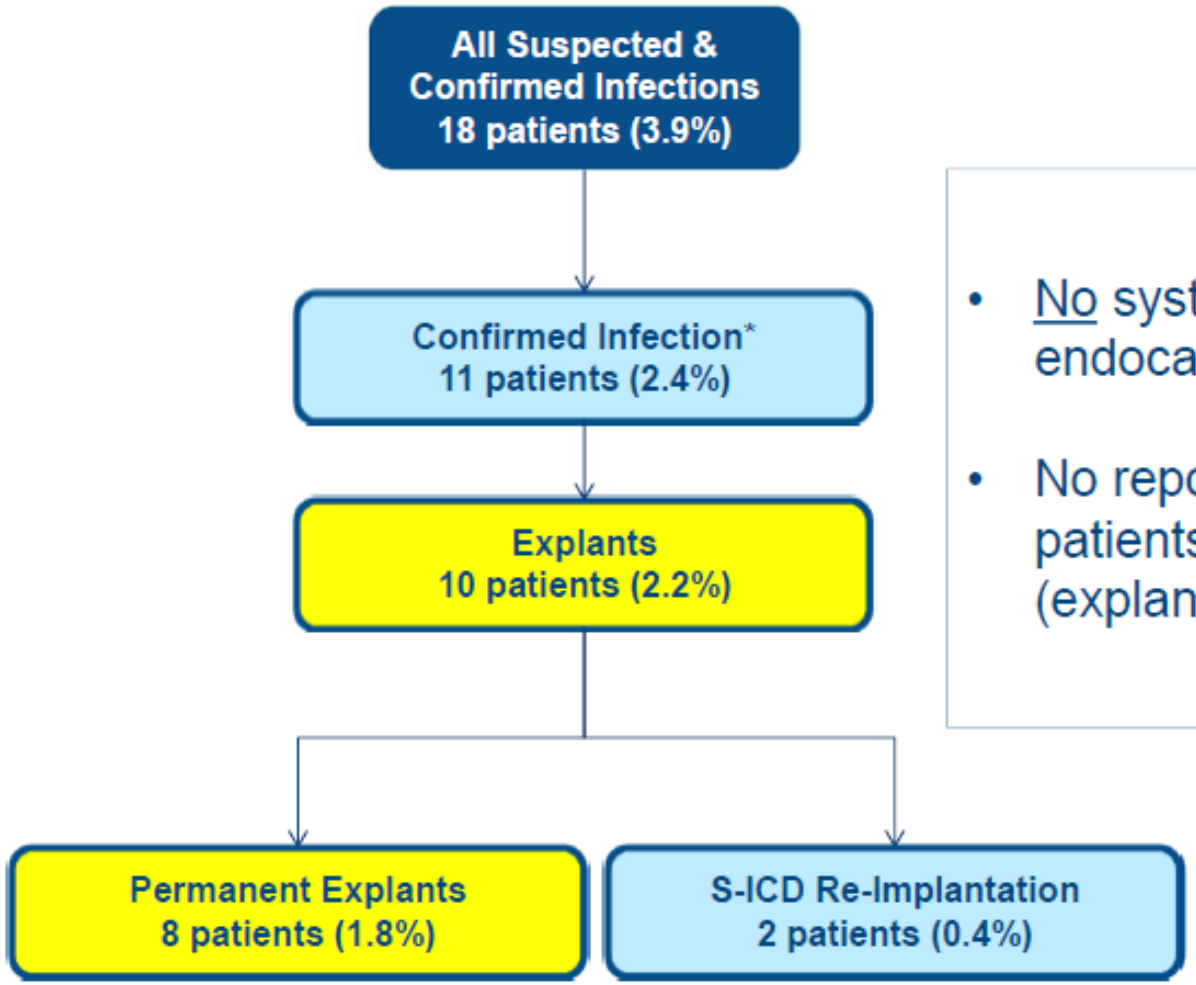
Perspectives from patients

"I want it to last as long as possible, worry-free"[2] –*Gary, Congestive Heart Failure*

"There is no minor surgery…anytime you get cut open you are opening yourself up to getting an infection"[2] – *Tom, ICD Patient*

[1]High Voltage Patient Survey, January 2011. Double-blind online survey administered by 3rd party vendor; conducted among 189 high voltage device patients.
[2]Verbatims from double-blinded focus groups of congestive heart failure patients, led by independent moderators in Minneapolis, Philadelphia, and San Francisco.

EFFORTLESS S-ICD™ System Registry
Infections



- No systemic blood infections or endocarditis
- No reports of infection in patients with previous TV-ICDs (explanted due to infection)

DEtect long-term COmplications after icD rEplacement: a multicenter Italian registry

Registro DECODE

983 patients, ICD and CRTD Replacement or upgrade
Minumum 12 months FU

Infection rate 1.2%

Clinical-decode@isis.it

DECODE Registry Group

Longevity: SICD vs TVICD

Which device in a 28 yrs old pt?

Infection risk

Age : 28
TVICD implant
Longevity Device

Age: 64
2 replacement

3-4%

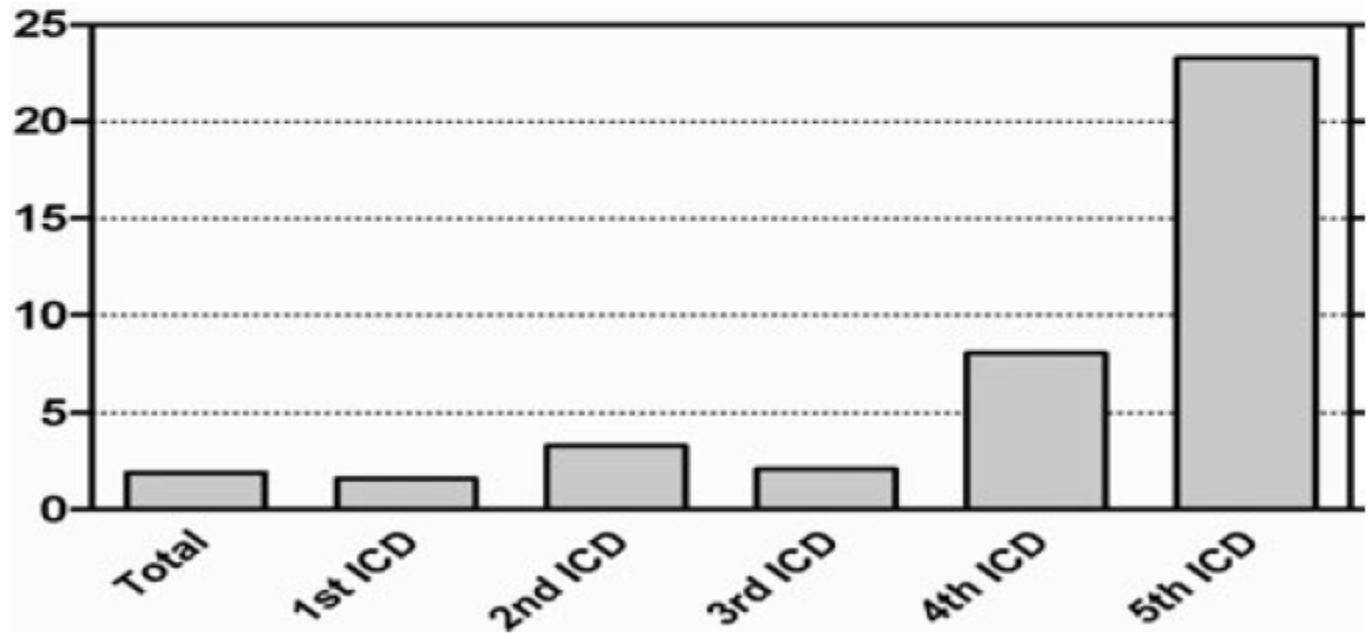
Age: 63
4 replacement

13-15%

Age: 28
SICD implant
Longevity Device

Requirement for Re-intervention per Consecutive Implanted ICD

	Total	1st ICD	2nd ICD	3rd ICD	4th ICD	5th ICD
Number of ICDs	3,161	2,415	609	107	24	6
Events	145	90	46	5	3	1
Total years implanted	7,632.3	5,949	1,406	236	37	4.3
Events per 100 ICD-years	1.9	1.5	3.3	2.1	8.1	23.3
(95% CI)	(1.6–2.2)	(1.2–1.9)	(2.4–4.4)	(0.7–4.9)	(1.7–18.3)	(0.6–129.6)



Complications : Risk factors

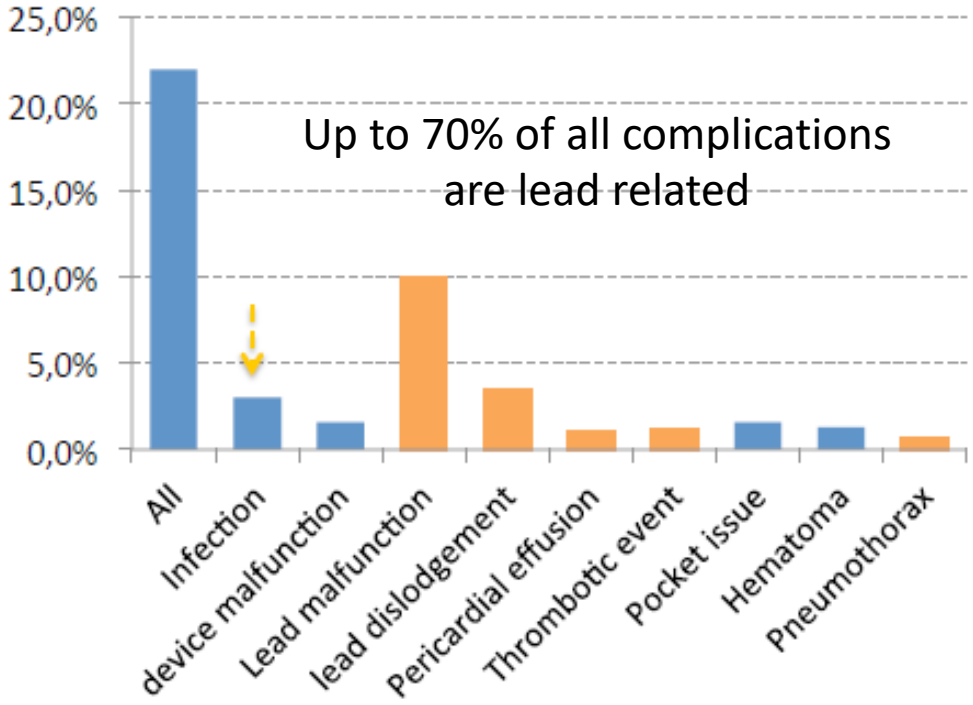
The study involves a retrospective analysis of claims data from the OptumLabs™ Data Warehouse (OLDW), which includes de-identified claims data for privately insured and Medicare Advantage enrollees in a large, private, U.S. health plan

Endpoint	Variable	Hazard Ratio (95% CI)	P value
Infection 1.9%	History of AF	1.27 (1.10 - 1.47)	0.001
	History of Diabetes	1.46 (1.26 - 1.69)	<0.001
	Male Sex	1.19 (1.01 - 1.41)	0.038
	History of Renal Disease	1.40 (1.17 - 1.67)	<0.001
	1 additional procedure	2.27 (1.86 - 2.78)	<0.001
	2 additional procedures	4.63 (3.45 - 6.22)	<0.001
	3 additional procedures	4.36 (2.41 - 7.89)	<0.001
	4+ additional procedures	6.86 (3.28 - 14.37)	<0.001
Mechanical 5.3%	Older Age (≥ 65)	0.84 (0.76 - 0.92)	<0.001
	Male Sex	0.76 (0.69 - 0.83)	<0.001
	Implant year 2009-2015	0.76 (0.70 - 0.83)	<0.001
	ICD without an LV Lead	0.77 (0.70 - 0.84)	<0.001
	History of MI	0.84 (0.77 - 0.92)	<0.001
	History of PVD	0.88 (0.78 - 1.01)	0.061
	1 additional procedure	1.02 (0.87 - 1.20)	0.784
	2 additional procedures	1.15 (0.87 - 1.51)	0.338
	3 additional procedures	1.29 (0.79 - 2.09)	0.312
	4+ additional procedures	1.49 (0.76 - 2.93)	0.249

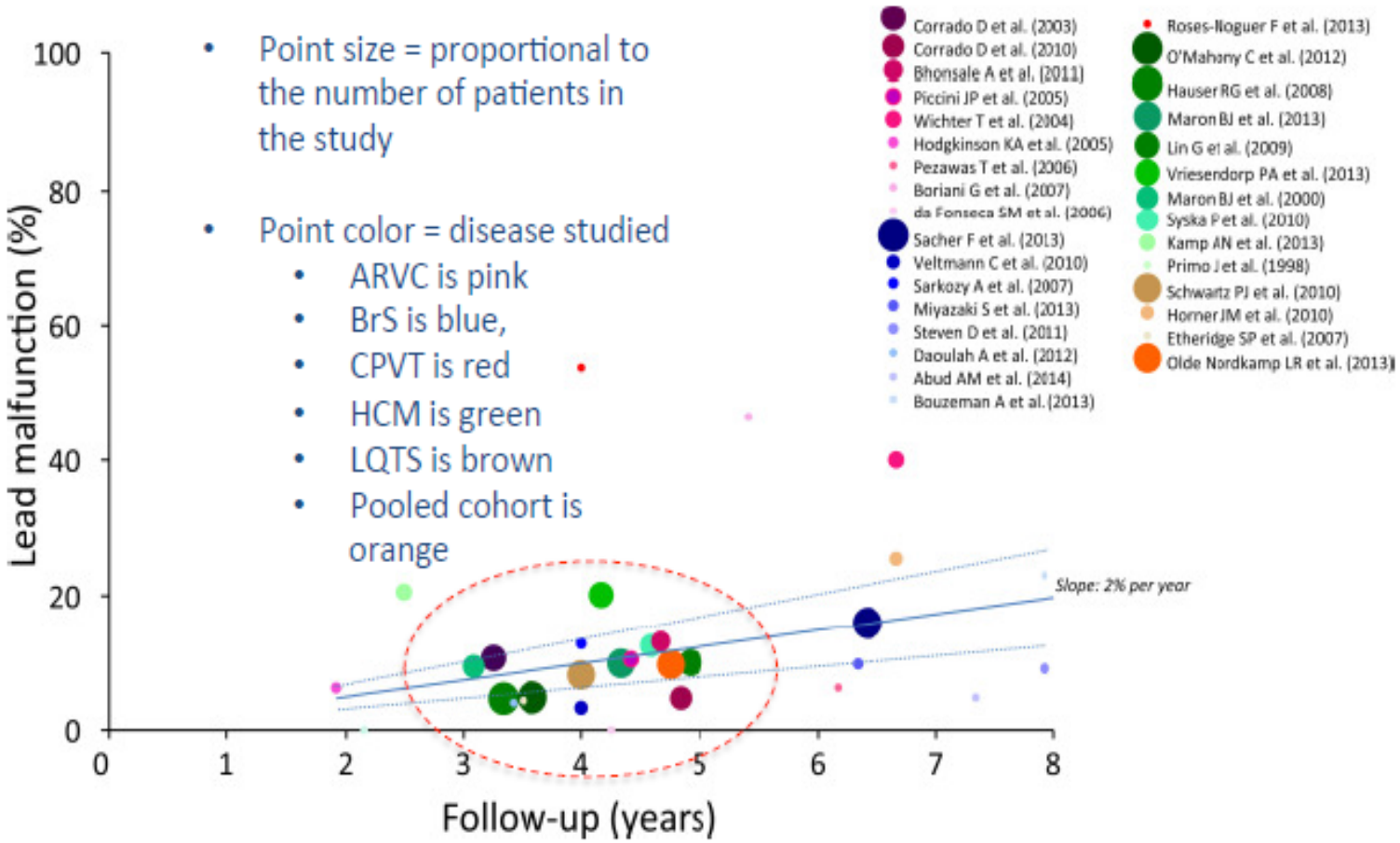
40837 CIED (28537 SC/DC ICD)

Koneru JN et al. J Am Coll Cardiol 2018; 7(10): in press

Lead Failure is most important source of complications in "young" pts



- Metanalysis of 63 study populations
- N=4195 ICD
- Mean Age: 39±15
- FUP: 53±26 months



High crude annual slope rate of 2% per year (20% at 10 yrs), but long term FU studies beyond 5 yrs after implant are scarce

Olde Nordkamp LRA et al. Heart Rhythm 2016; 13(2): 443-454

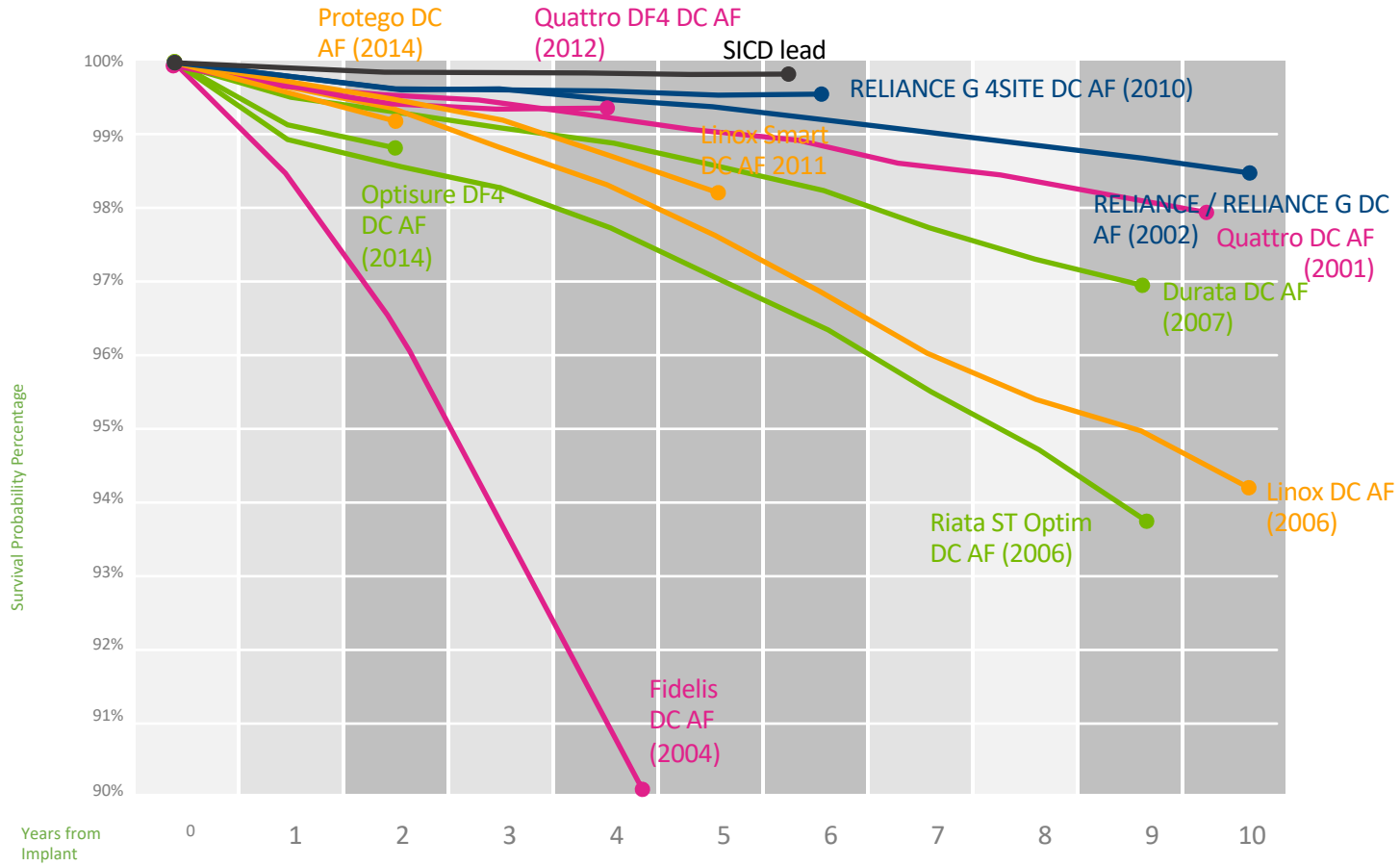
Proven Lead Reliability

Mismatch between PPR and real world: what's the problem?

>97%

Survival after 10 years of follow-up Reliability of most recent active fixation model families.

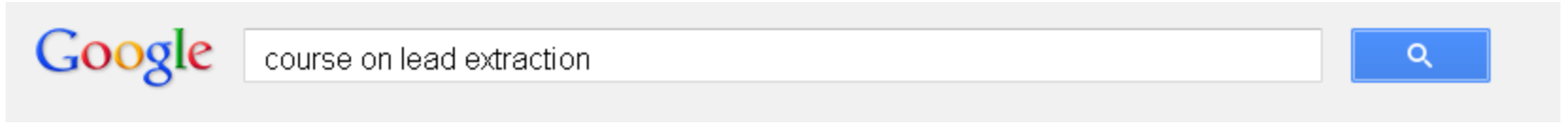
- Boston Scientific
- Medtronic
- St. Jude / Abbott
- Biotronik



Mandatory:
more attention to the implant technique !

Liu J et al. Am J Cardiol 2014; 113: 103-106

Van Malderen S CH et al. Heart rhythm 2016; 13: 2299-2305



Pathways for **training** and accreditation for transvenous **lead extraction**
europace.oxfordjournals.org/lookup/.../eur338?... - Traduci questa pagina
di JC Deharo - 2012 - Citato da 11 - Articoli correlati
A full appreciation of the pathophysiology of CIED implantation is critical to understanding of the risks and the **training** required for successful **lead extraction**.

Pathways for **training** and accreditation for transvenous **lead ...**
europace.oxfordjournals.org/content/.../124.**extract** - Traduci questa pagina
di JC Deharo - 2012 - Citato da 11 - Articoli correlati
Pathways for **training** and accreditation for transvenous **lead extraction**: a European Heart Rhythm Association position paper. Authors (EHRA Task Force **...**

Pacemaker and Defibrillator **Lead Extraction** - Circulatio
circ.ahajournals.org/content/123/11/e378.full - Traduci
di E Buch - 2011 - Citato da 6 - Articoli correlati
These guidelines outline the indications for l ications and **training**, and the tools and techniqu part **...**

Lead extracti
my.cleve **tract**.aspx - Traduci questa pagina
ic Heart & Vascular Institute is a leader in heart care nt in the United States.

ransvenous **Lead Extraction**: Heart Rhythm Society Expert **...**
https://www.hrsonline.org/content/.../2009-HRS_**LeadExtraction**.pdf
di LM Epstein - Articoli correlati
Transvenous **Lead Extraction**: Heart Rhythm Society. Expert Consensus on Facilities, **Training**, Indications, and. Patient Management. This document was **...**

HRS & AHA Guidelines | Spectranetics
www.spectranetics.com/.../**lead**...**training**/guideline... - Traduci questa pagina

NO Training course on Lead Implantation !!

SICD : learning curve

Table 2 Complications in the first 6 months

Description	Number of events
System infection	16
Electrode movement	7
Suboptimal electrode position	7
Erosion	5
Discomfort	4
Haematoma	4
Suboptimal pulse generator and electrode position	4
Adverse reaction to medication	3
Inadequate/prolonged healing of incision site	3
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Seroma	1
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Significative but very similar

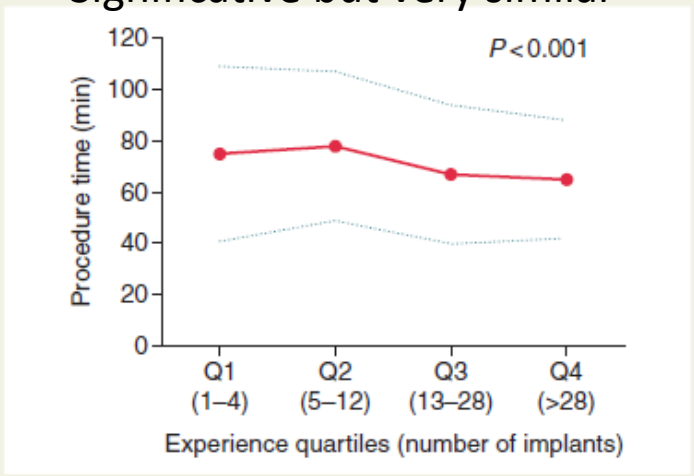

Table 3 Multivariable Cox proportional hazard model for complications

Characteristic	Hazard ratio (95% CI)	*P* value
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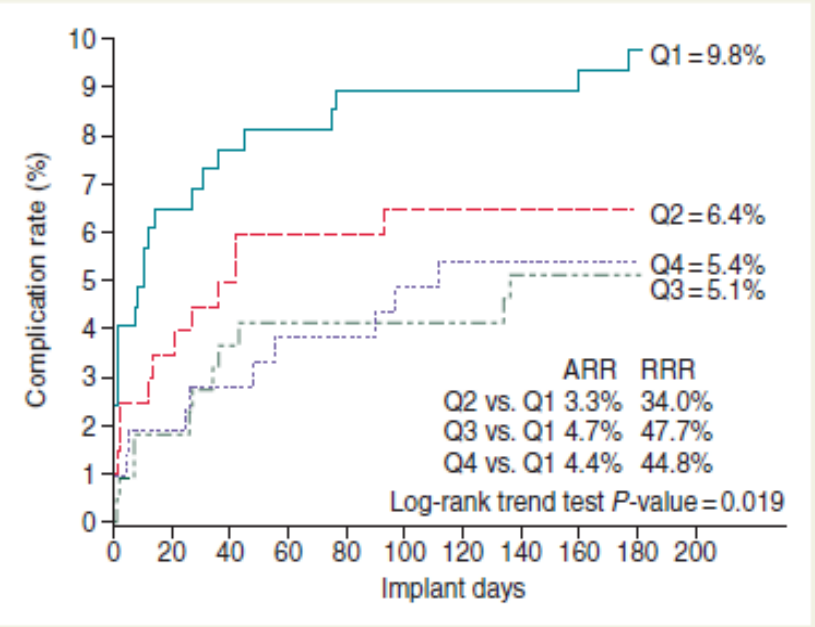


Figure 1 Kaplan–Meier analysis of experience quartiles and complications at 180 days. Q1: Experience Quartile 1 (implants 1–4); Q2: Experience Quartile 2 (implants 5–12); Q3: Experience Quartile 3 (implants 13–28); Q4: Experience Quartile 4 (implants >28); ARR, absolute risk reduction; RRR, relative risk reduction. *P* value is Kaplan–Meier trend test.

The complication rate of 9.8% decreased with increasing experience of individual implanters and stabilized after 13 implants per implanter at 5.4%

Knops R et al. Europace 2016; 18: 1010-1015

Non-lead complications

Complication	S-ICD N	S-ICD KM rate, %	TV-ICD N	TV-ICD KM Rate, %
Total	14	13.7	21	18.0
Lead	1		17	
Infection	5	4.1	4	3.6
Erosion	3	3.0	2	1.5
DFT failure	1	0.7	0	0
Inappropriate sensing	2	3.2	0	0
Device failure	1	1.1	1	0.8
Appropriate therapy	12	17.0	39	31.1
Inappropriate shocks	20		22	
SVT	3	4.2	21	17.6
Cardiac death	1	2.0	2	1.7

SMART PASS reduces IS due to TWO

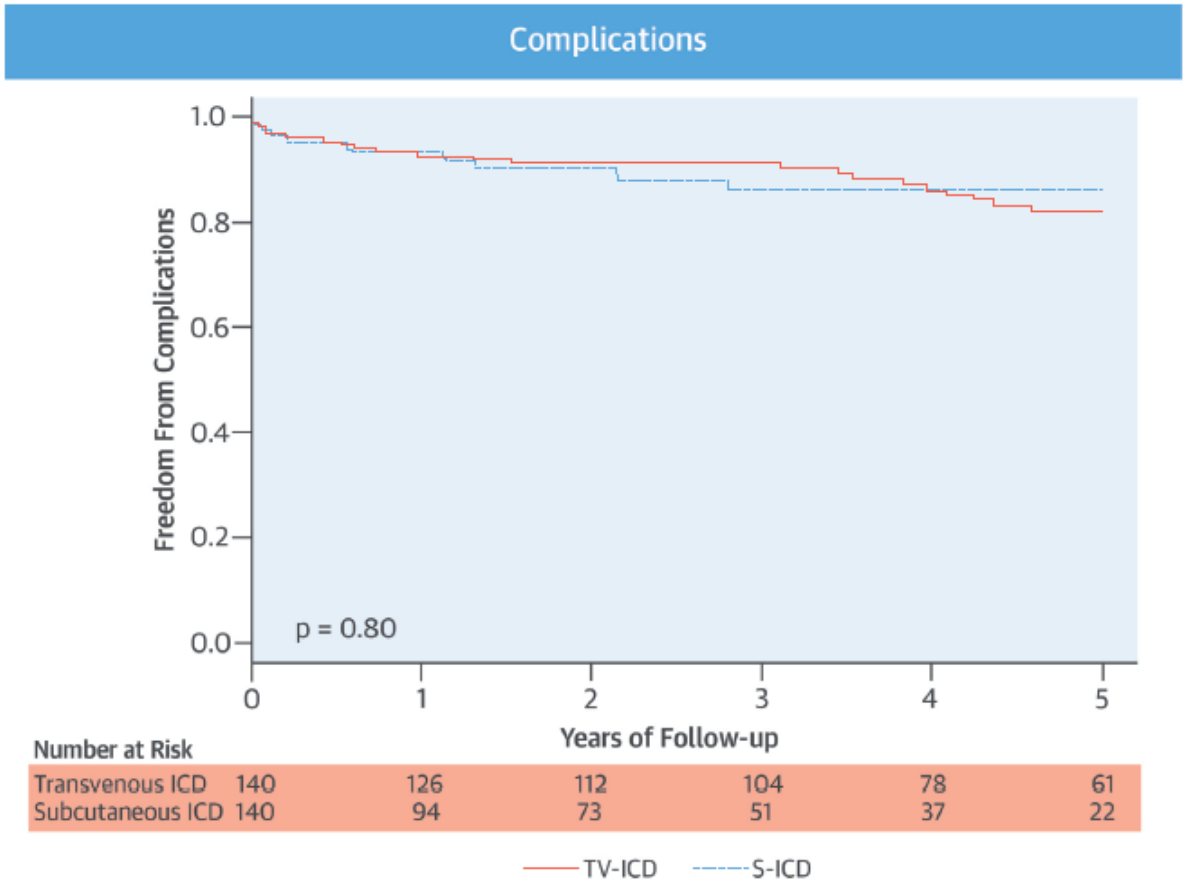
Brouwer TF et al. JACC 2016; 68(19):2047-55

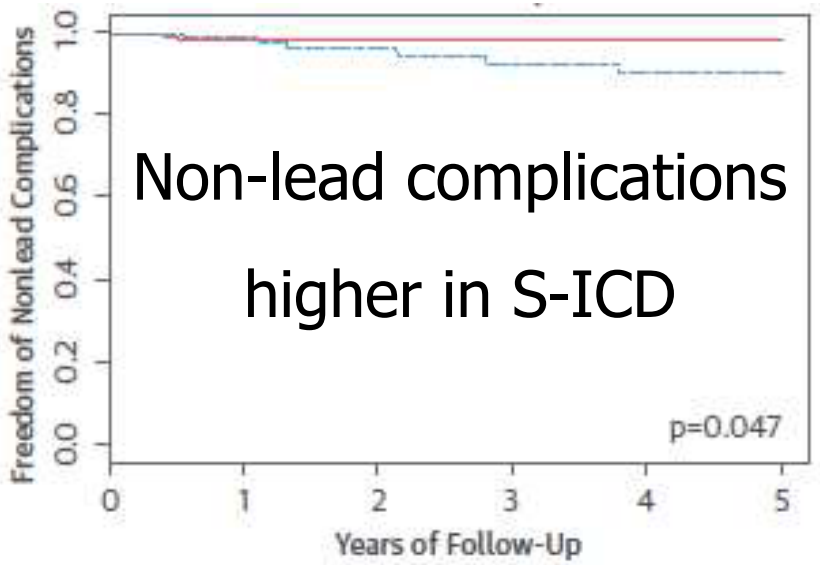
Long term outcomes: S-ICD vs TV-ICD

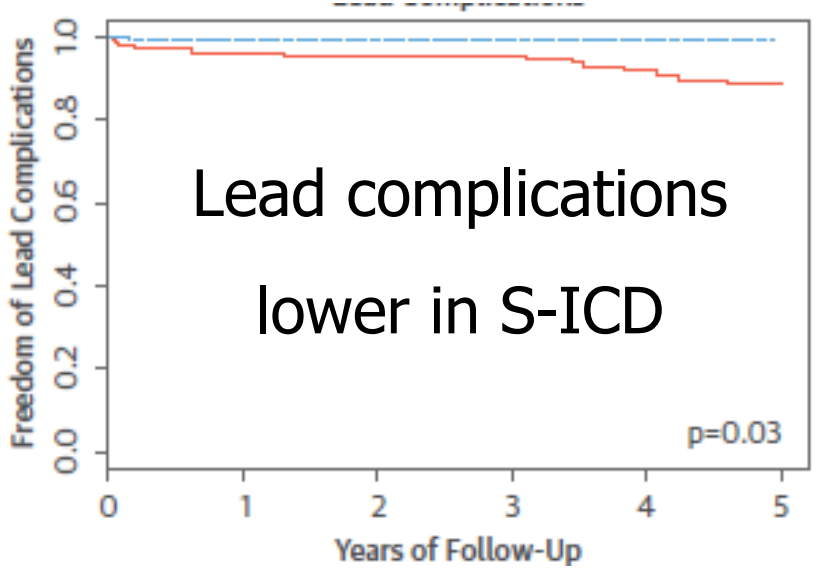
Brouwer TF et al. JACC 2016; 68(19):2047-55

140 SICD vs 140 TV ICD after propensity match

NO differences in overall complication

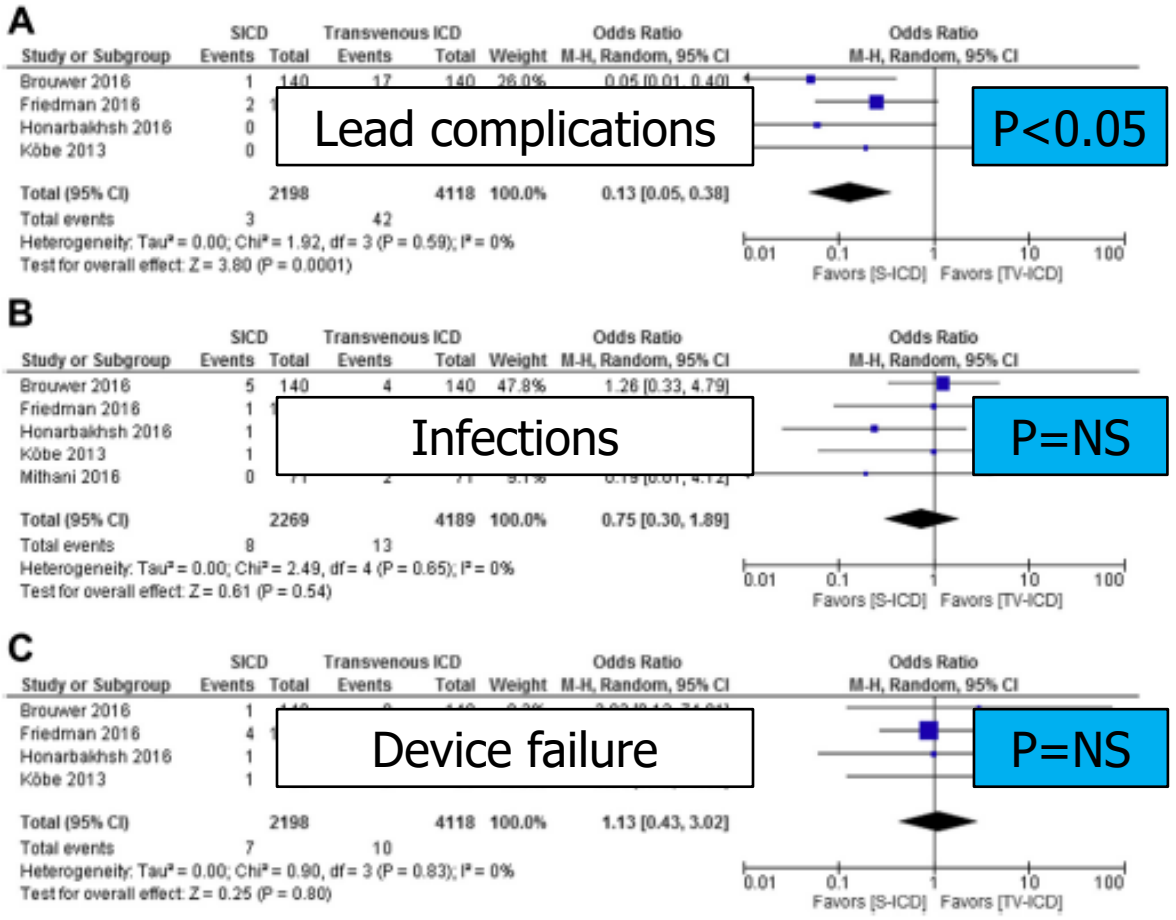






Subcutaneous Versus Transvenous Implantable Defibrillator Therapy

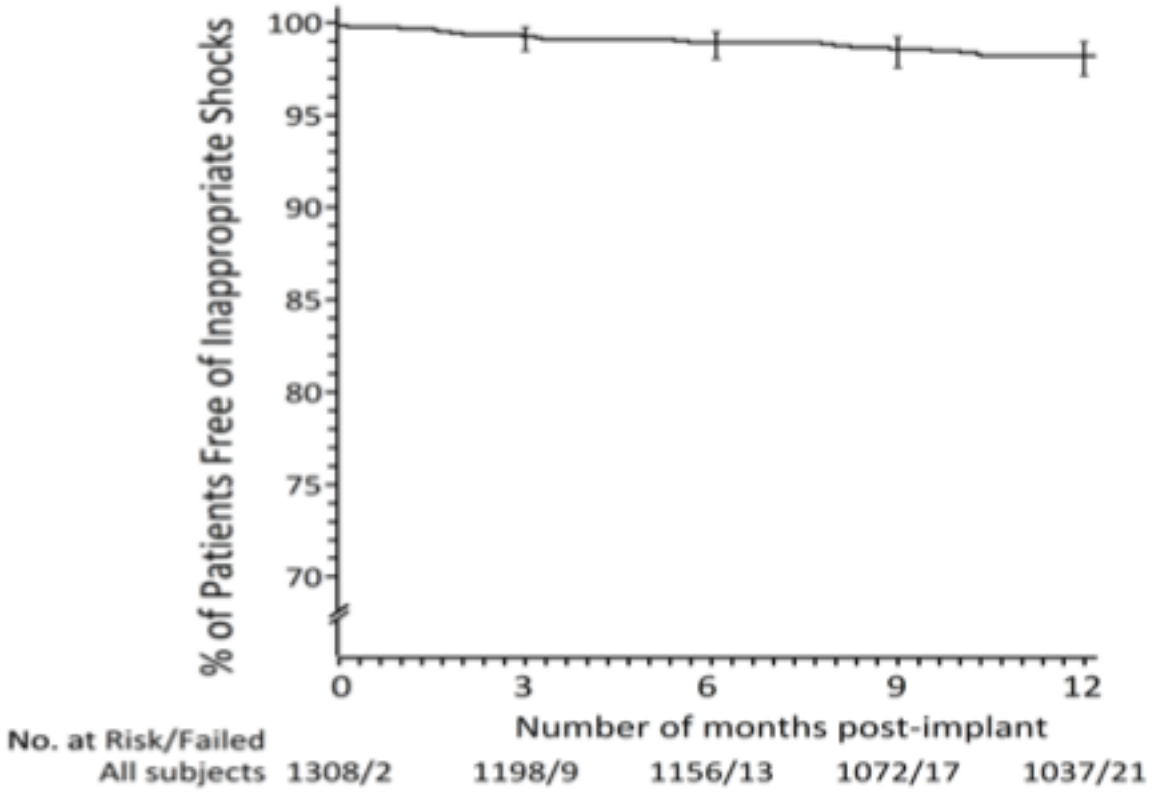
A Meta-Analysis of Case-Control Studies



Basu-Ray I et al. JACC: clinical eletrophysiol 2017; 3: 1475-1483

Inappropriate Shock Free Rate: PAINFREE SST-2

98.2% inappropriate shock free rate at 1 year



NO More ES !!

Inappropriate Shock Free Rate at 1 year	95% C.I. Lower Bound	95% C.I. Upper Bound	N. pts with inappropriate shock
0.982	**0.974**	**0.990**	**21**

Different impact of long-detection interval and anti-tachycardia pacing in reducing unnecessary shocks: data from the ADVANCE III trial

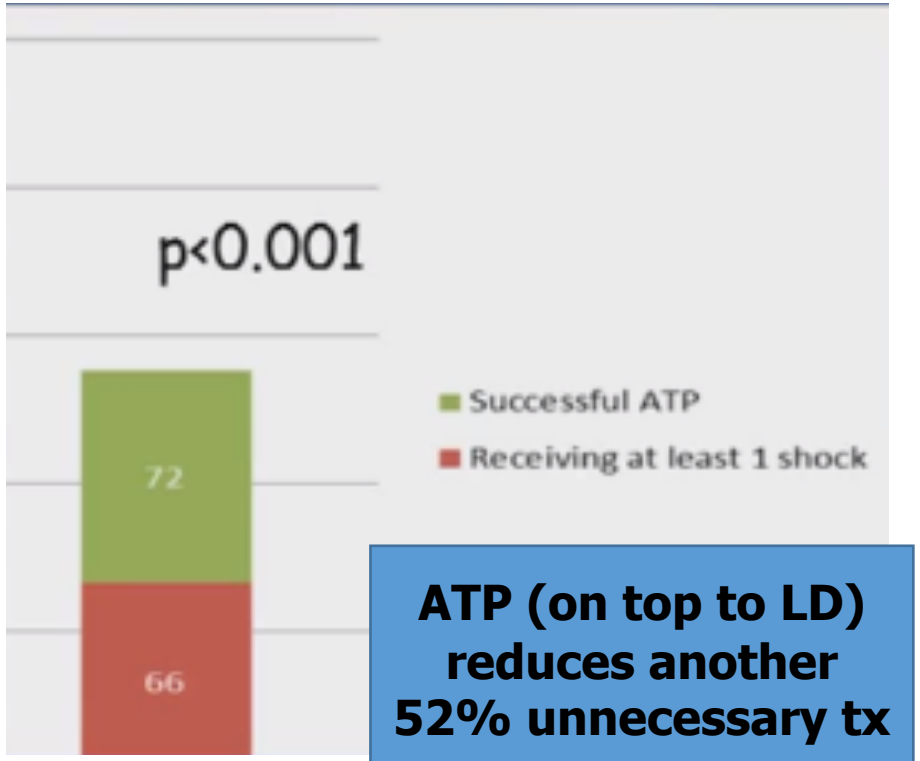
Added value

- **Long detection vs longer detection**
- **Primary and secondary prevention**
- **Any ICD type**
- **All ICD therapies**

Considering Shock only….

LD reduces 37% unnecessary tx

But



ATP (on top to LD) reduces another 52% unnecessary tx

Arenal A et al. Europace 2016;8:1719-25

Why anti-tachycardia pacing?

To Reduce Pain and Anxiety and Increase Device Acceptance

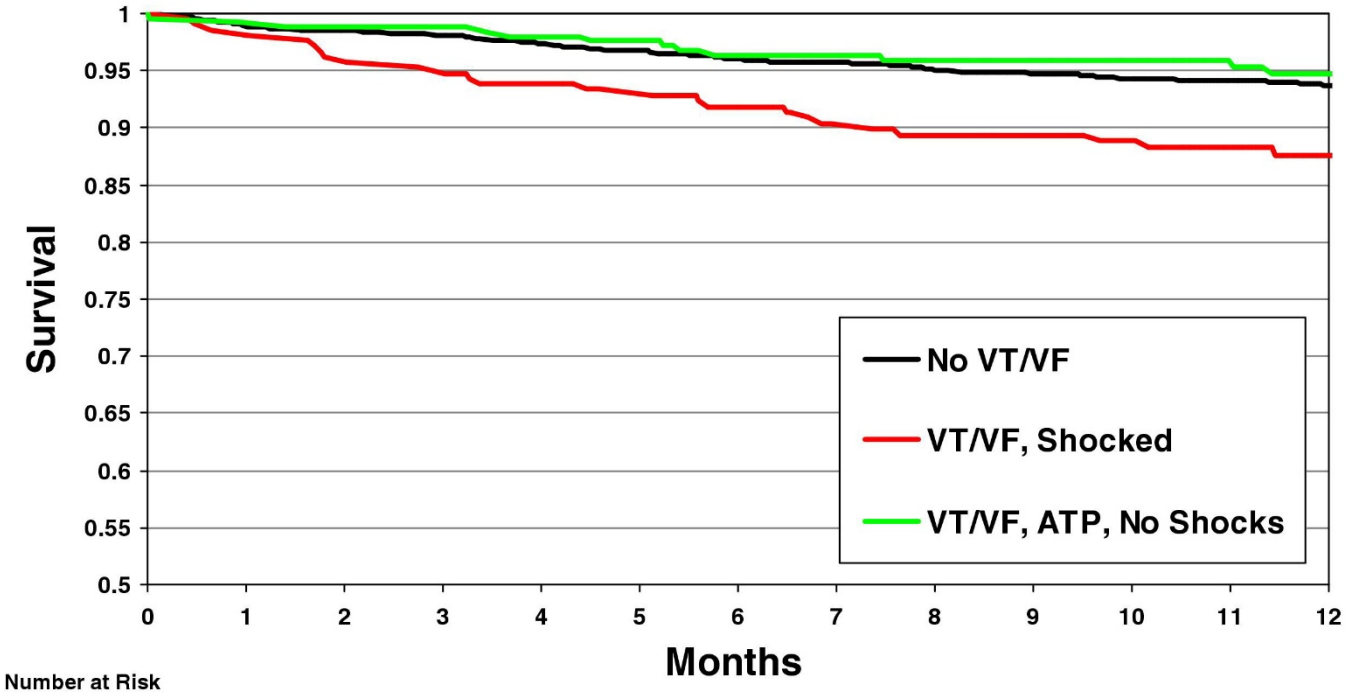
To Reduce Healthcare Burden and Improve Patient Quality of Life

Avoiding Shocks May Improve Survival/Heart Failure

Differences in effects of electrical therapy type for ventricular arrhythmias on mortality in implantable cardioverter-defibrillator patients

For FVT (32% shocked, 68% ATP), episode and therapy effects could be uncoupled.

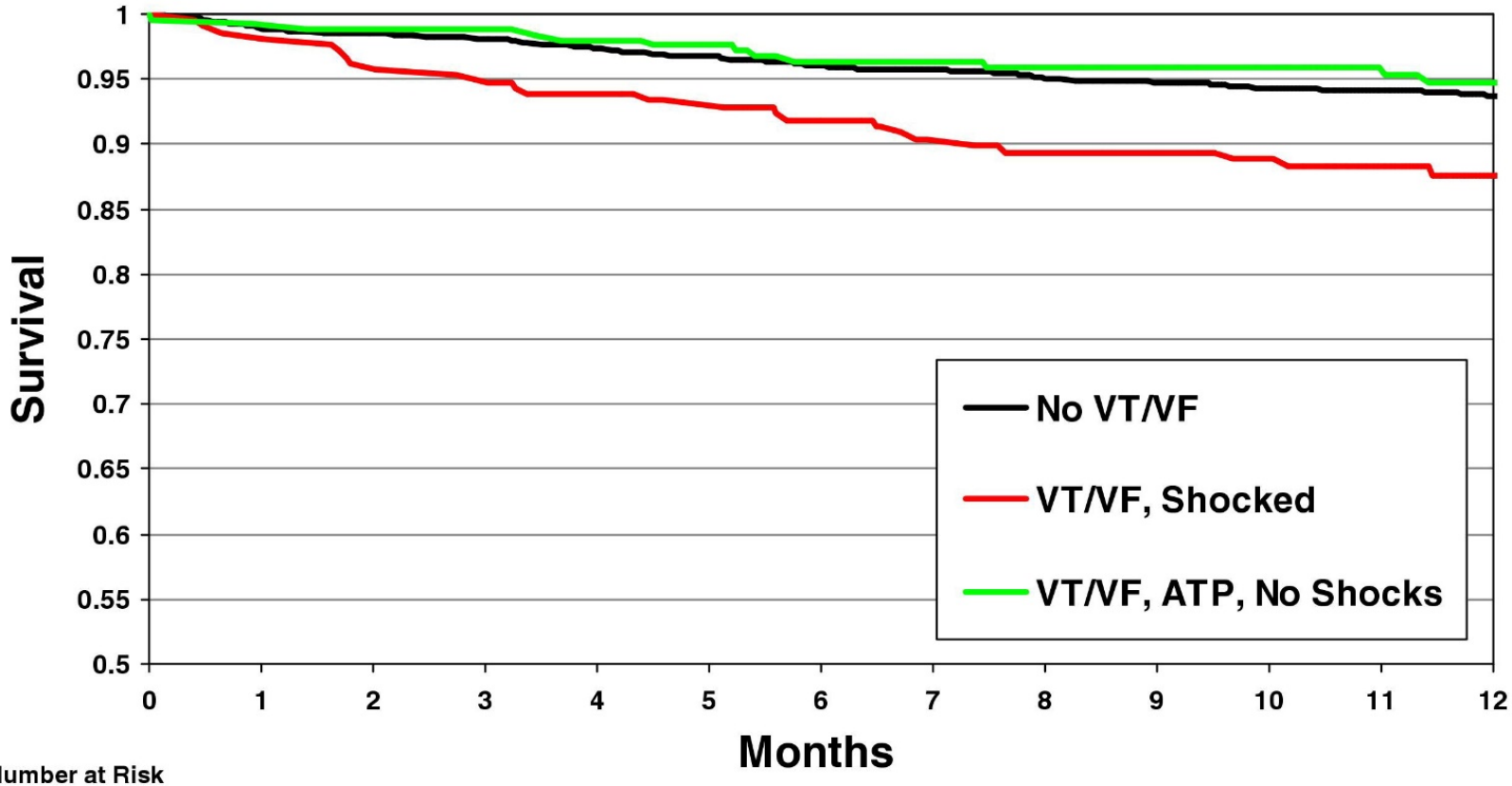
ATP-terminated FVT did not increase episode mortality risk,
whereas
shocked FVT increased risk by 32%.



Number at Risk				
No VT/VF (N=1671)	1584	1472	1355	812
VT/VF, Shocked (N=211)	201	186	172	97
VT/VF, ATP, No Shocks (N=253)	247	229	206	126

Heart Rhythm 2010;7:353–360.

ATP vs Shock



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ATP recommendations

Recommendations for all pts with SHD and ATP-capable ICDs, to reduce total shocks, except when ATP is documented to be ineffective or proarrhythmic:	Class of Recommendation and level of evidence
ATP therapy to be active for all ventriculartachyarrhythmia detection zones to include arrhythmias up to 230 bpm	I A
ATP therapy to be programmed to deliver at least 1 ATP attempt with a minimum of 8 stimuli and a CL of 84-88% of the tachycardia CL for ventricular tachyarrhythmias	I A

Wilkoff B et al. Heart Rhythm 2015

Sweeney MO et al. Heart Rhythm 2010;7:353–360.

Evento	Data/Ora	Tipo	Terapia	Durata hh:mm:ss
V-1373	03 ott 2018 14:50	TV-1	ATPx1	00:01:04
V-1372	30 giu 2018 10:15	VNonSost	Non sostenuti	00:00:04
V-1371	04 apr 2018 15:36	TV-1	ATPx1	00:01:05
V-1370	02 apr 2018 10:37	VNonSost	Non sostenuti	00:00:36
V-1369	02 apr 2018 10:36	VNonSost	Non sostenuti	00:00:09
V-1368	02 apr 2018 10:35	VNonSost	Non sostenuti	00:00:32

AI V-Detect

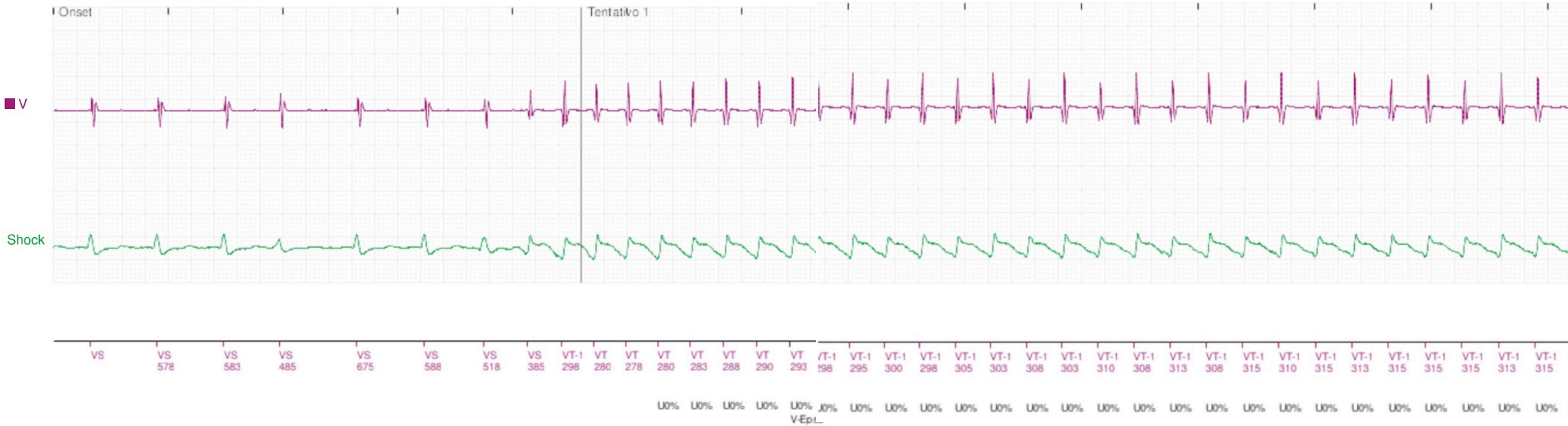
Frequenza V media	192 min^{-1}
zona di frequenza;	TV-1
RhythmID correlato	Falso
RhythmMatch™	0 %
SRD soddisfatto	(Falso, Off)
Timeout ATP	Falso

Tentativo 1, Raffica V ATP

Tempo trascorso	00:00:52
Informazioni ATP	
Numero raffiche	1

Evento terminato 00:01:04

EGM visualizzato a 25 mm al secondo




VT-1 313
VT-1 310
VT-1 313
VT-1 315
VT-1 308
VT-1 315
VT-1 313
VT-1 313
VT-1 315
VT-1 313
VP 275
VP 275
VP 275
VP 275
VP 275
VP 275
VP 275
VP 275
–
VS 655
VS 448
VS 510
VS 490
VS 498
VS 493
VS 493
VS 495
VS 495
U0%
U0%
U0%
U0%
U0%
U0%
U0%
U0%
U0%
RID-
V-Detect

Implantable cardioverter-defibrillator programming and electrical storm: Results of the OBSERVational registry On long-term outcome of ICD patients (OBSERVO-ICD)

ES: 4.7% at 3 years

ES predicts CHF-related deaths and Overall Mortality

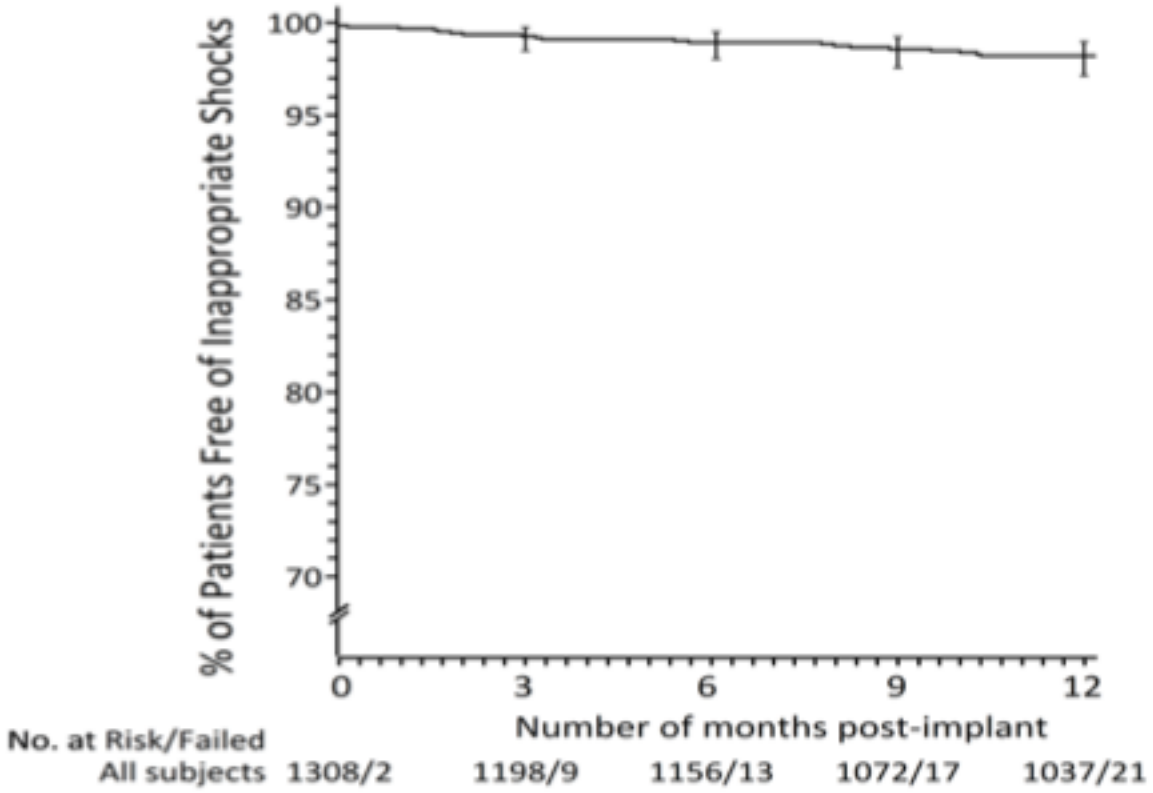
Slow VF detection zone
NO ATP Before or During Charging
SHORT detection Time of VT or VF

} **ALL predict Electrical storms**

Guerra F et al. Heart Rhythm2016;13:1987–1992

Inappropriate Shock Free Rate: PAINFREE SST-2

98.2% inappropriate shock free rate at 1 year



NO More ES !!

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ATP is effective

But

We don’t have strong predictors of effectiveness

How much are we willing to pay?

Cost .....


Boston Scientific
EMBLEM MRI
S-ICD
A219
SN 000000

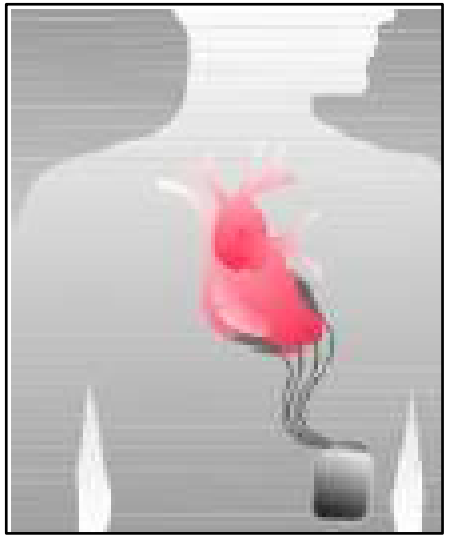

Medtronic
Visia AF MRI
SureScan


Medtronic
Visia AF MRI
SureScan

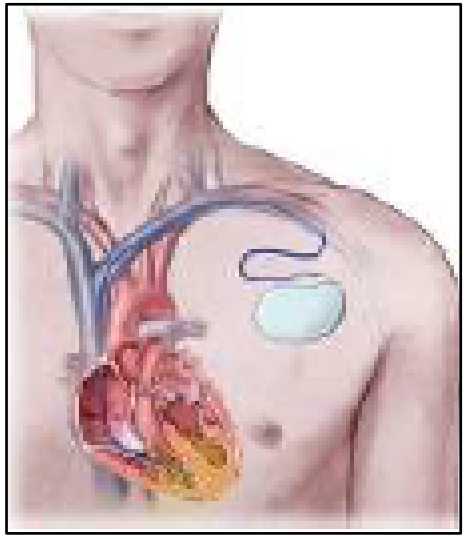

7.3
5.1
S-ICD System
EMBLEM S-ICD


ENERGEN ICD
Boston Scientific

ICD Hystory



Abdominal ICD
with epicardial lead
and patch



Subcutaneous ICD
with transvenous
lead

Intermuscolar ICD
with subcutaneous
lead

String defibrillator

PAST	PRESENT	FUTURE

THE TIME IS NOT RIPE. BUT WE DO NOT RULE OUT THE POSSIBILITY IN THE FUTURE.

Xiao Wunan

S-ICD Weakness

- The more you need it
- The more you miss it

S-ICD screening failure

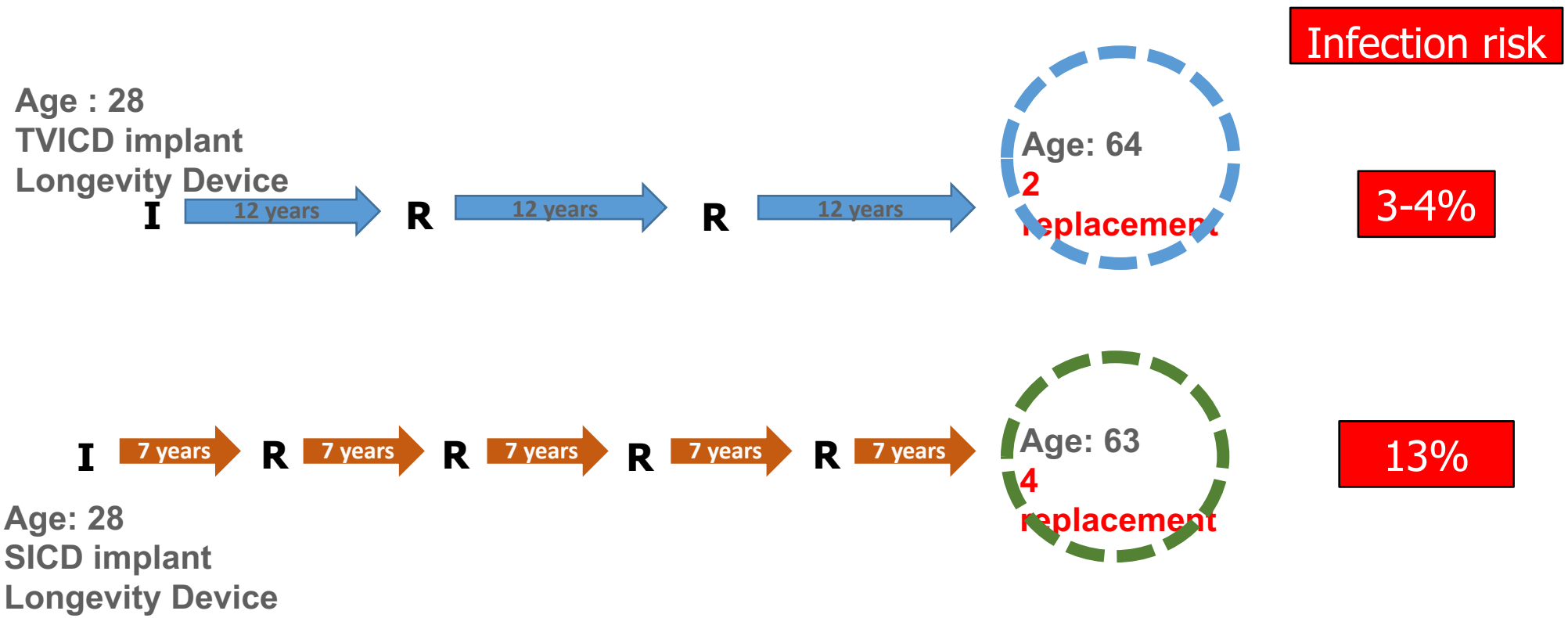
In 13% of patients with inherited primary arrhythmia syndromes.

In 18% with BrS

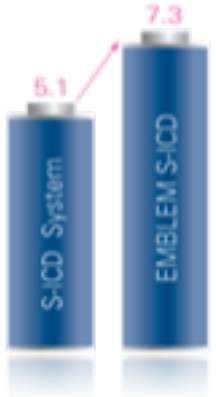
In 6% HOCM patients

In 25% of pediatric patients

Endurance is an Issue ….



That drives cost along ….



If you don't miss it, ….

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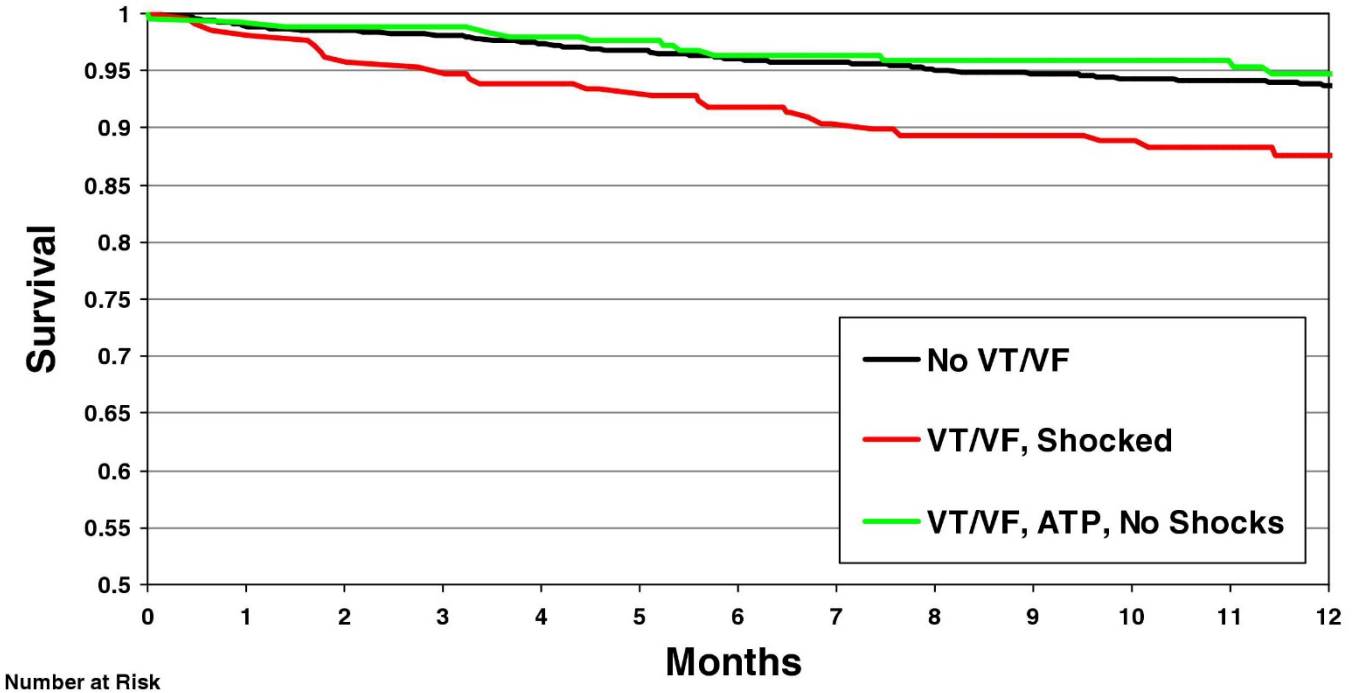

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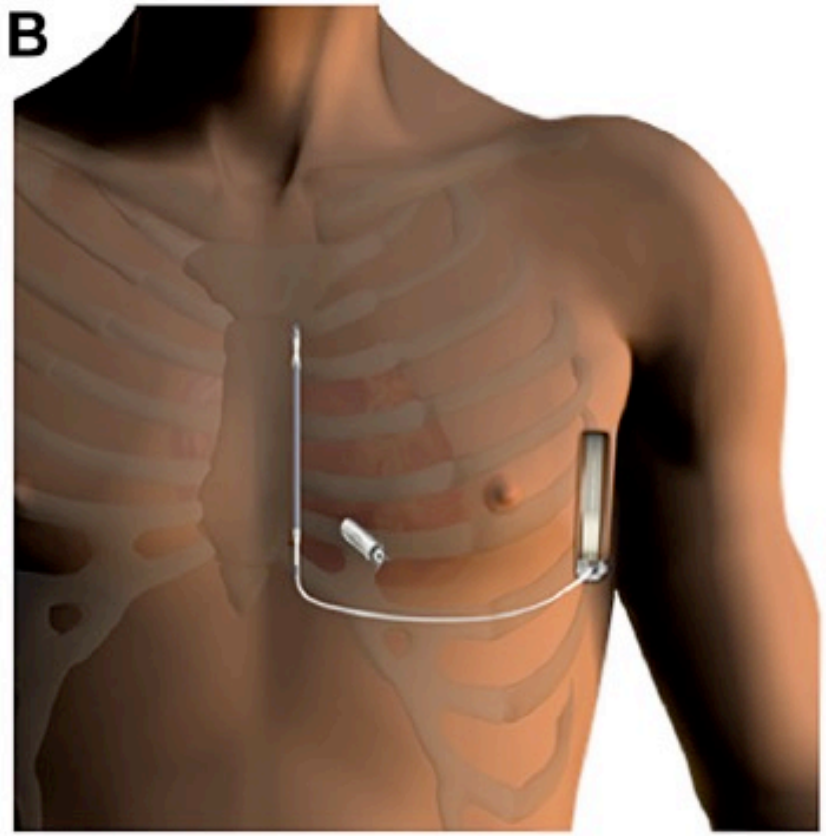
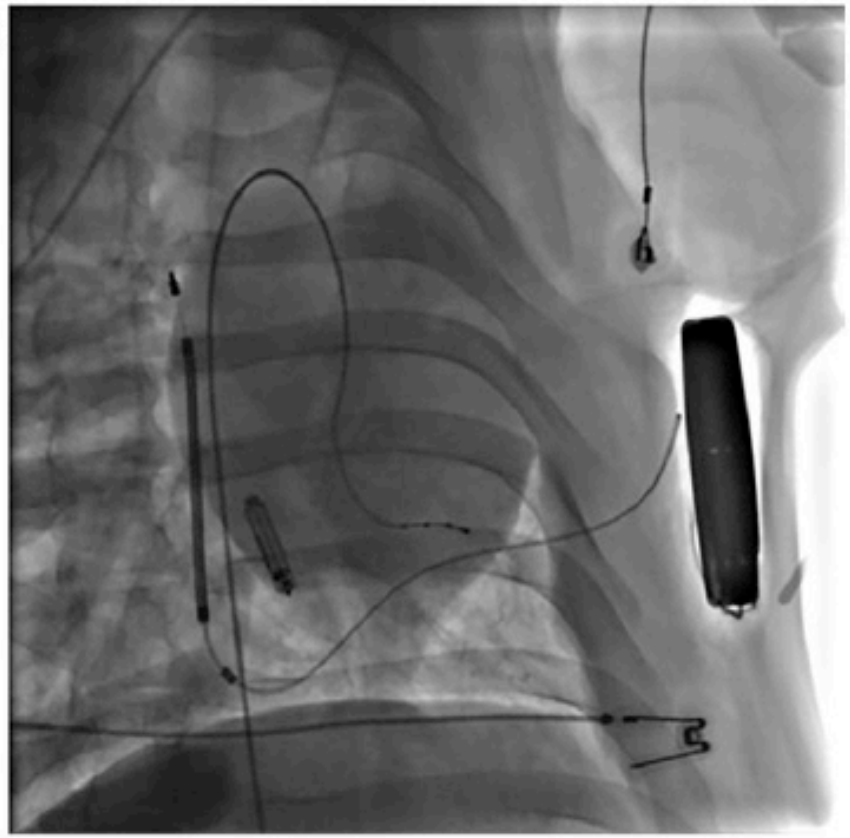
Heart Rhythm 2010;7:353–360.

Why striving after all of this ?

S-ICD, Leadless unit



NEED for ATP / VVIR pacing

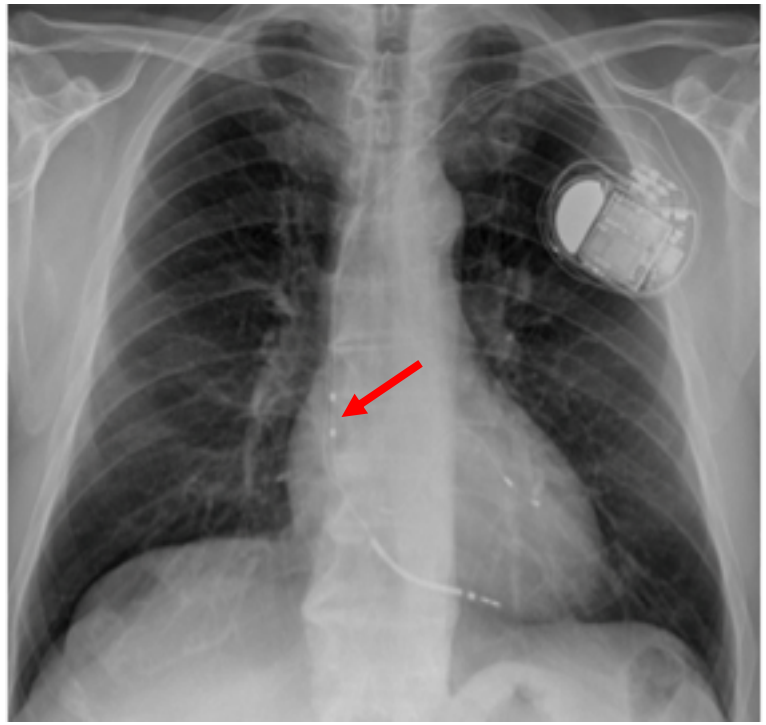


P detection, quad LV lead

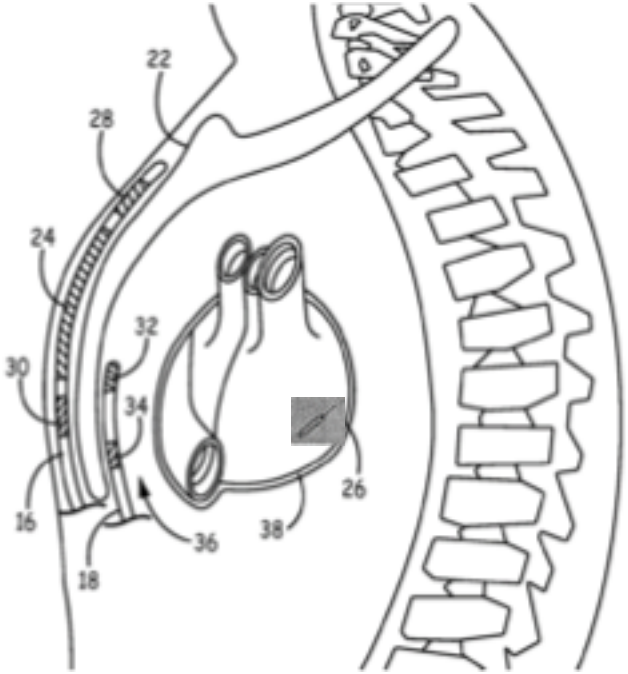
J Am Coll Cardiol EP 2017;3:1487–98

Key ISSUE of modular systems in SR Patients

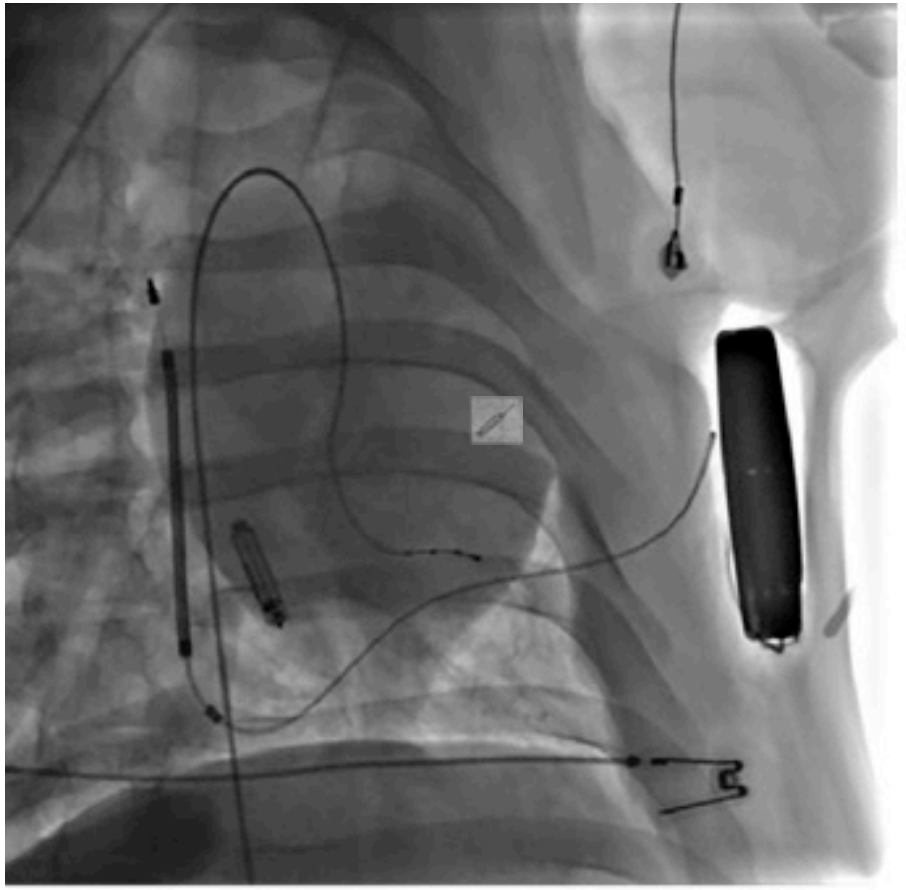
P wave detection !



Int J Cardiol 2017;249;184-90



Substernal ICD



The Future of implantable devices ?

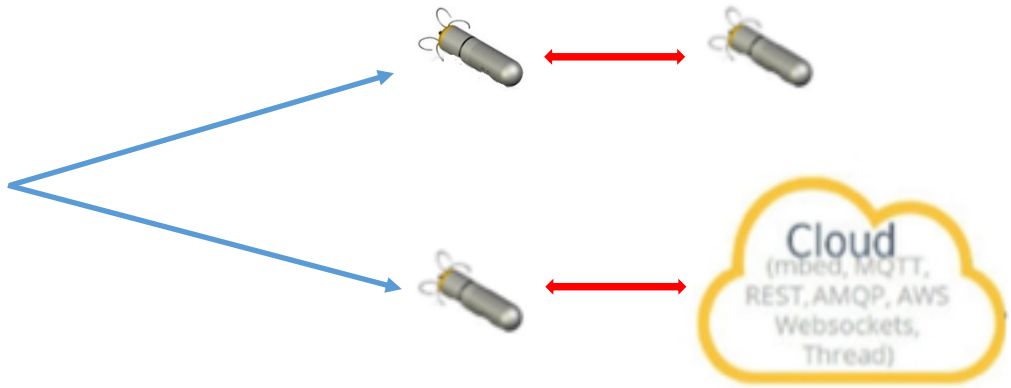
- ✔ Minimization
- ✔ Leadless
- ✔ Multitasking
- ✔ Low consumption

- Low energy communication
- Rechargeable battery
- Energy Harvesting


LIEBHERR
DANAFRIA

ISSUES with leadless devices : diagnostic data

- ✔ **Remote patient management**
- ✔ Multiparameter patient assessment
- ✔ Energy supply
- ✔ SMALL DEVICES

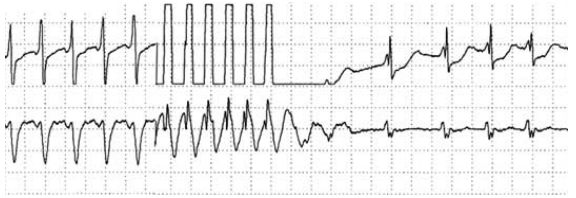


DOES it Matter how you save one life?

כָּל הַמַּצִּיל נֶפֶשׁ אַחַת מִיִּשְׂרָאֵל,
כְּאִילּוּ הִצִּיל עוֹלָם מָלֵא.

Kol hamatzil nefesh achât mi'Yisra'êl,
ke'ilu hitsil olâm malê.

Whoever saves a single life is as if
he had saved an entire universe.



EFFORTLESS S-ICD™ System Registry
Implant Procedure and Follow-up

Boston Scientific

Attribute	Statistic/Category	N	%
Implant Procedure	Patients implanted	456	95
	General anesthesia		63
	Medical imaging		13
	Skin-to-skin time, min*	69 ± 27	

+ 1 hour for patient setup

+ 30 minutes for patient weaning to cardiology ward

Conclusions

What do you prefer today?

TV-ICD

S-ICD

… in a long-term perspective ?

SICD : learning curve

Table 2 Complications in the first 6 months

Description	Number of events
System infection	16
Electrode movement	7
Suboptimal electrode position	7
Erosion	5
Discomfort	4
Haematoma	4
Suboptimal pulse generator and electrode position	4
Adverse reaction to medication	3
Inadequate/prolonged healing of incision site	3
Incision/superficial infection	3
Pulse generator movement/revision	3
Suboptimal pulse generator position	2
Failed defibrillation threshold test	2
Acute hypoxic respiratory failure	1
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Near syncope/dizziness/shortness of breath/confusion	1
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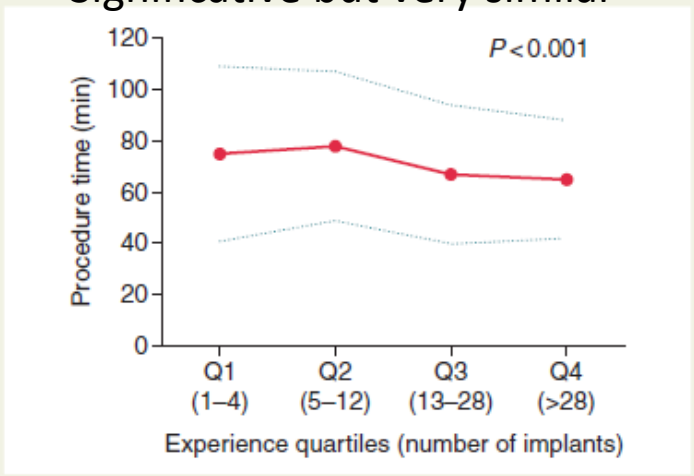

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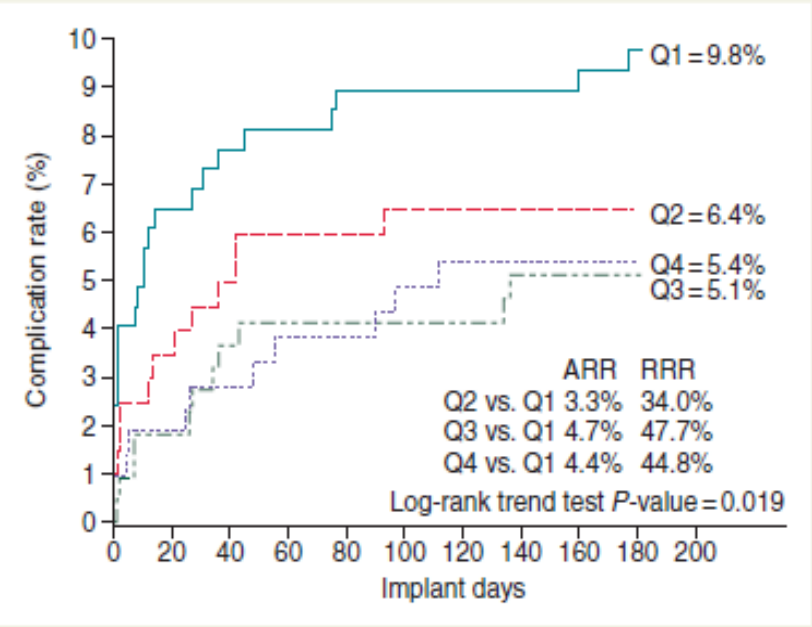

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