Secondary prevention: Should it be accompanied by VT ablation or not?

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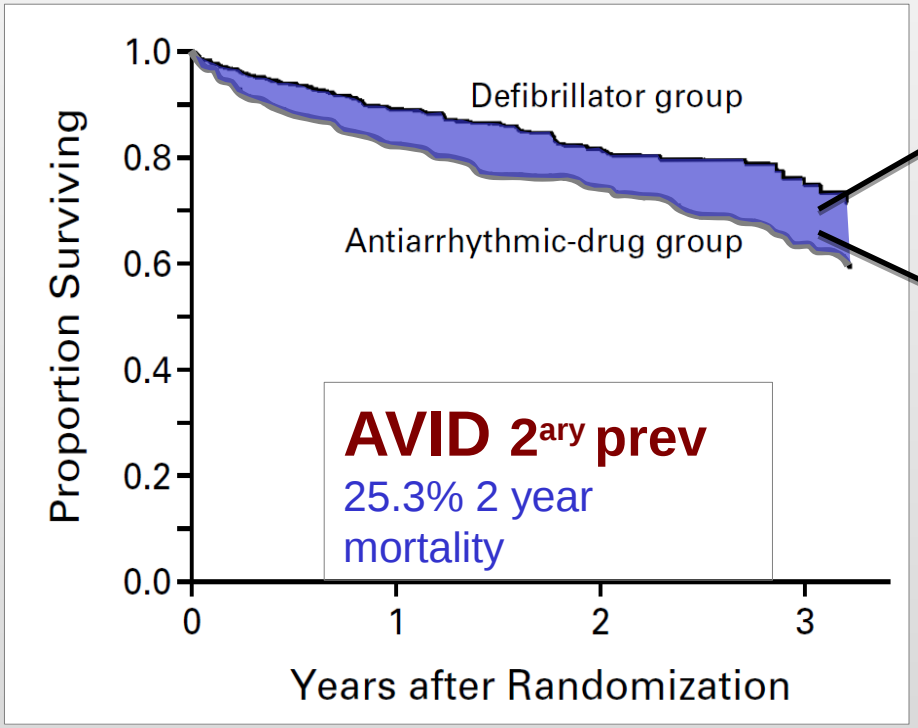
London Heart Rhythm Program
Western University

14th Annual
Collingwood, Ontario,
February 10 -12, 2017

Séminaire
Winter Arrhythmia
School
Annual Cardiac Arrhythmia Meeting
Division of Cardiology, University of Toronto

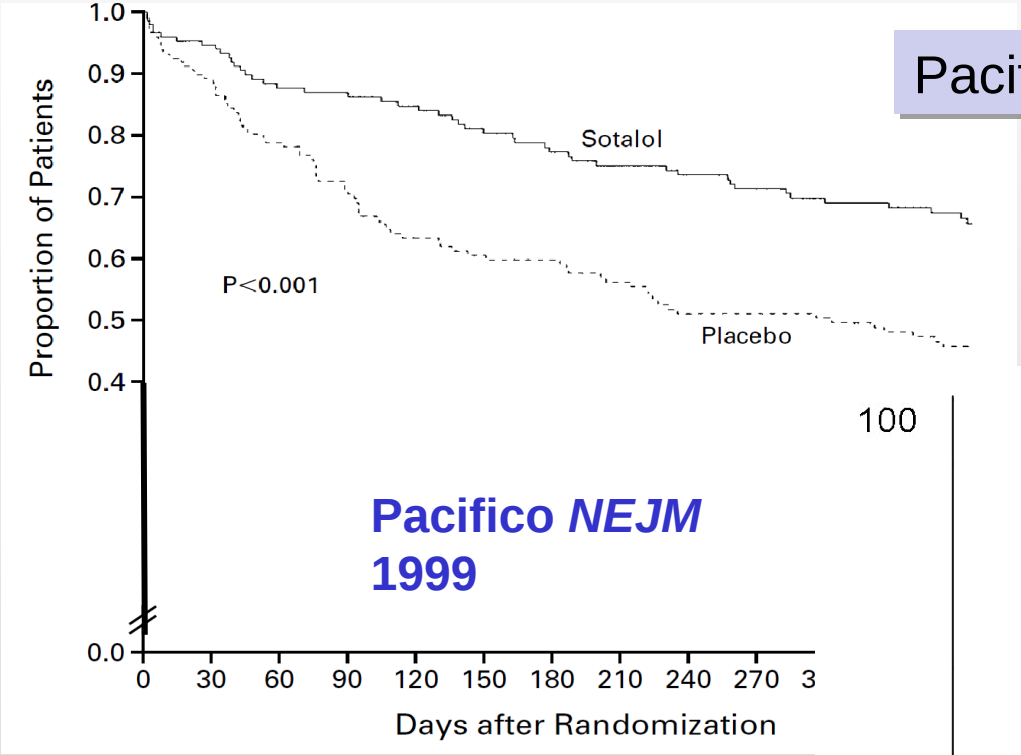
Effect of ICDs



VF
Polymorphic VT
Rapid VT / flutter
Hemodynamically unstable VT
Hemodynamically stable VT
(Non-target arrhythmia)

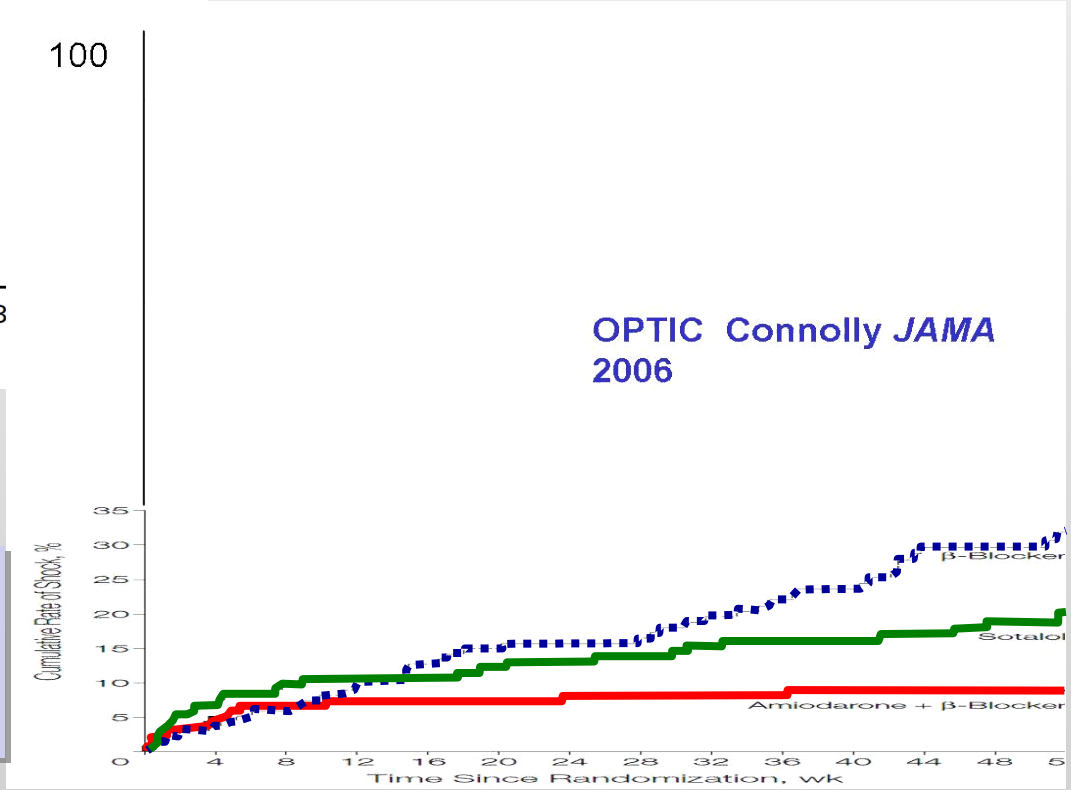
50% reduction in SCD in all populations tested

Sotalol Amiodarone



Pacifico: Sotalol 44% RR

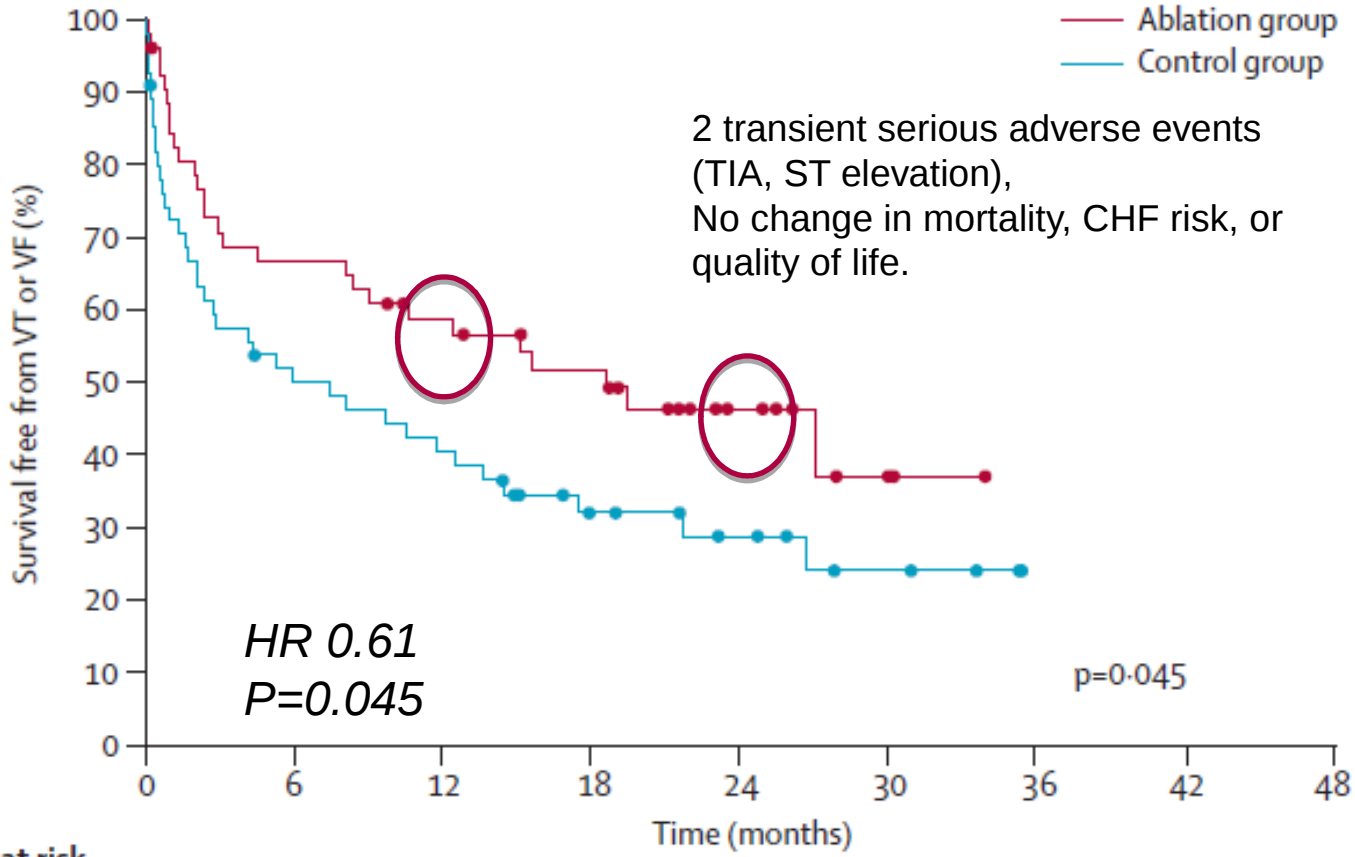
Pacifico *NEJM* 1999



OPTIC Connolly *JAMA* 2006

Connolly:
Sotalol 40% RRR,
Amio 73% RR

VTACH Results



Number at risk

Ablation group	52	34	28	21	9	3	0
Control group	55	26	21	12	8	4	0

Kuck *Lancet* 2010

Summary OF VT Ablation Trials

Study	1 year		2 yrs	
	Control	Ablation	Control	Ablation
V TACH[1]	40%	60%	30%	50%
IVTC[2]		70%		
VANISH[3]	50%	65%	40%	50%

VT Catheter ablation is a palliative procedure with high likelihood of recurrence

1. Kuck *Lancet* 2010

2. Tung R Heart Rhythm 2015

3. Sapp J et al NEJM 2016

International VT Ablation Center Collaborative

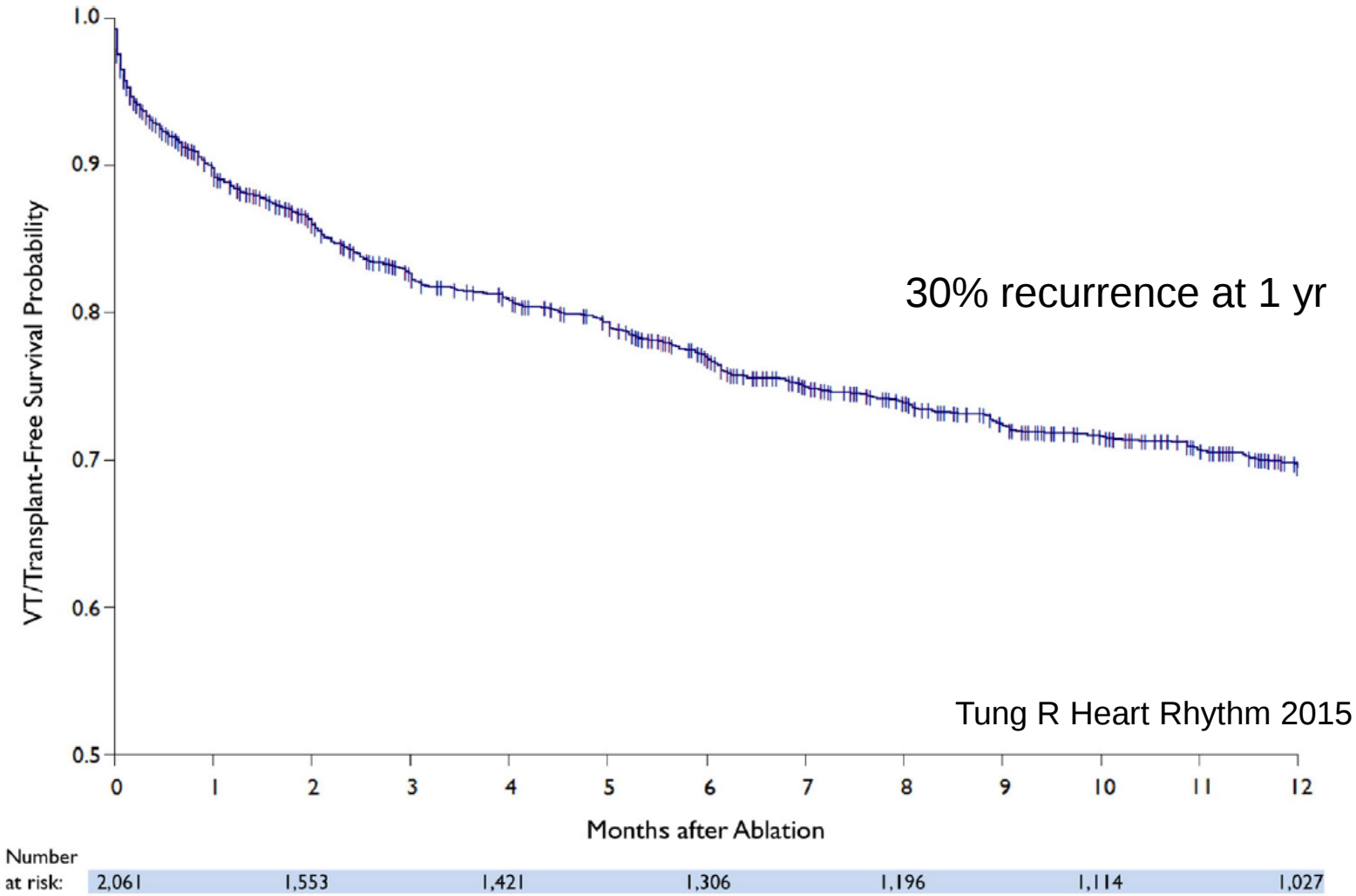
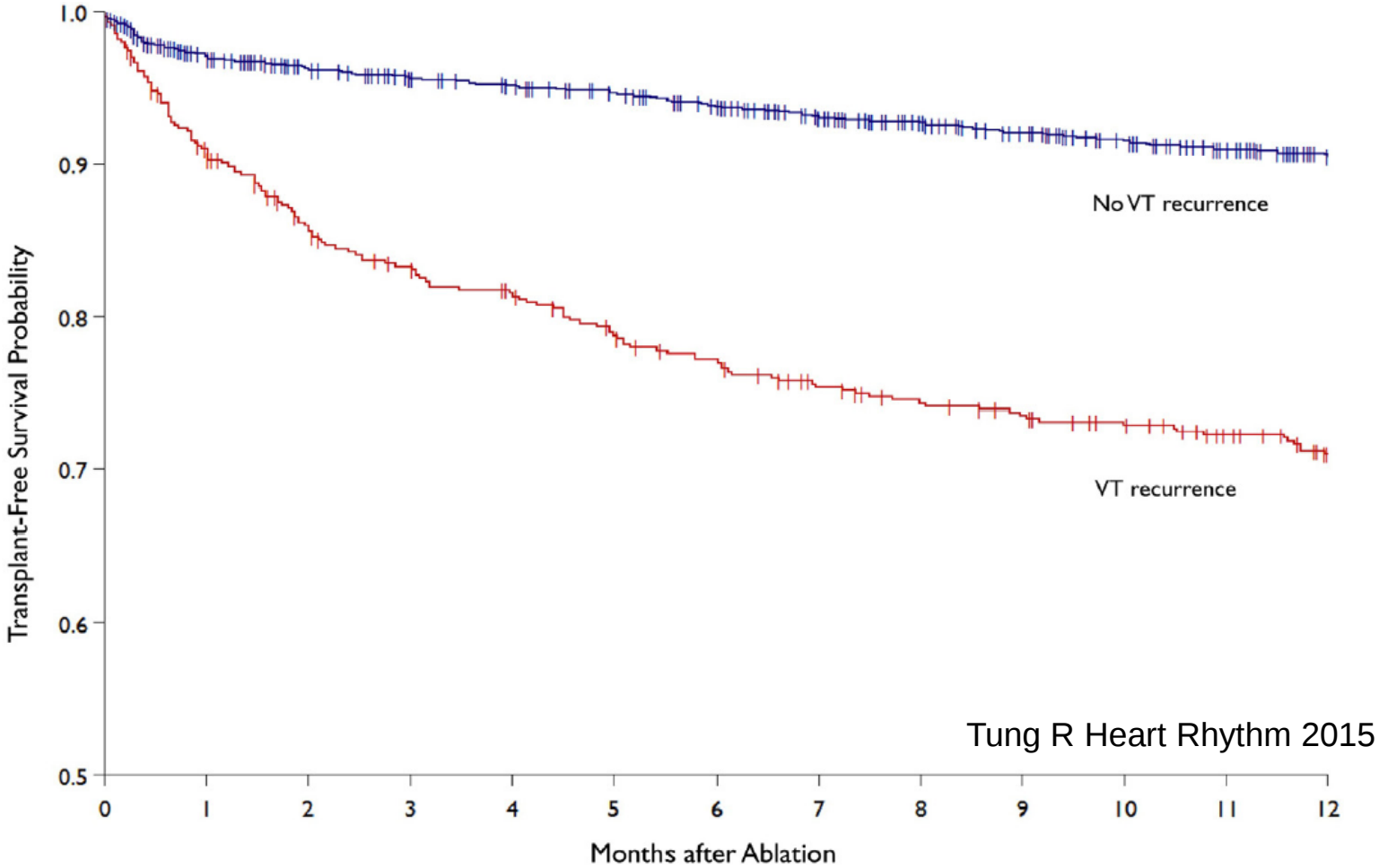


Figure 2 Kaplan–Meier estimate of ventricular tachycardia (VT) and transplant-free survival in the overall cohort.

International VT Ablation Center Collaborative



Tung R Heart Rhythm 2015

Number at risk:						
1,525	1,278	1,241	1,194	1,134	1,087	1,024
536	445	415	387	363	346	321

Patients were different in almost every way

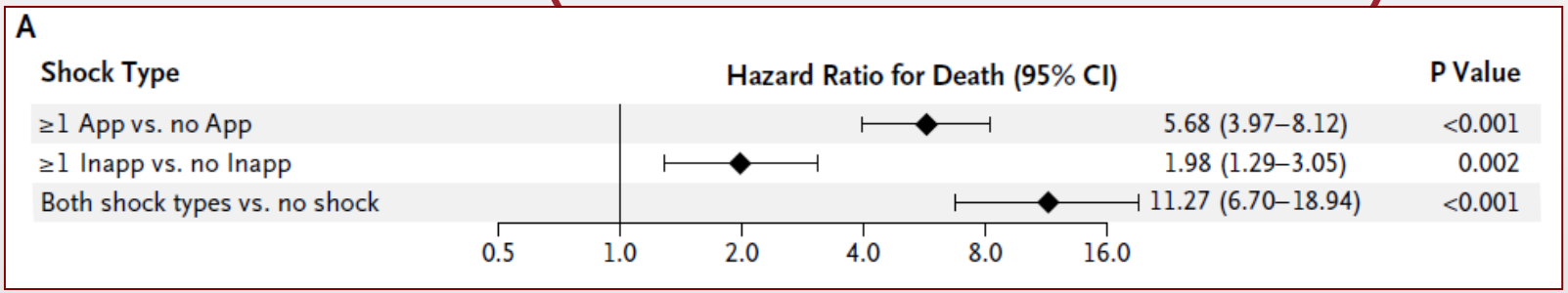
Table 1 Patient characteristics by VT recurrence and mortality

	VT recurrence within 12 months			Transplant/death within 12 months		
	Yes (N = 536)	No (N = 1525)	*P* value	Yes (N = 273)	No (N = 1788)	*P* value
Age (years)	65.0 (55.0–72.0)	64.0 (54.0–72.0)	.341	66.0 (59.0–74.0)	64.0 (54.0–72.0)	**<.001**
Female	81 (15.1)	184 (12.1)	.083	35 (12.8)	230 (12.9)	1
ICM	257 (47.9)	838 (55.0)	**.006**	147 (53.8)	948 (53.0)	.850
EF Preablation	28.0 (20.0–40.0)	35.0 (25.0–45.0)	**<.001**	24.0 (20.0–30.0)	35.0 (25.0–45.0)	**<.001**
NYHA			**<.001**			**<.001**
I	92 (18.8)	466 (32.5)		23 (8.9)	535 (32.1)	
II	193 (39.5)	525 (36.6)		71 (27.6)	647 (38.8)	
III	164 (33.5)	372 (25.9)		113 (44.0)	423 (25.4)	
IV	40 (8.2)	71 (5.0)		50 (19.5)	61 (3.7)	
ICD	487 (92.8)	1251 (84.2)	**<.001**	250 (94.7)	1488 (85.2)	**<.001**
CRT	165 (31.4)	348 (23.4)	**<.001**	107 (40.5)	406 (23.3)	**<.001**
Electrical storm	220 (43.8)	464 (32.3)	**<.001**	147 (57.4)	537 (31.9)	**<.001**
ICD shocks	344 (72.7)	869 (62.7)	**<.001**	176 (76.2)	1037 (63.7)	**<.001**
Hypertension	285 (58.8)	753 (56.4)	.407	140 (58.6)	898 (56.8)	.662
Atrial fibrillation	163 (33.5)	394 (28.7)	.052	97 (39.3)	460 (28.5)	**<.001**
Diabetes mellitus	128 (24.4)	305 (20.6)	.073	92 (35.4)	341 (19.5)	**<.001**
Chronic kidney disease	169 (31.7)	436 (28.7)	.213	126 (46.5)	479 (26.9)	**<.001**
Baseline creatinine	1.1 (0.9–1.5)	1.1 (0.9–1.4)	.199	1.3 (1.0–1.7)	1.1 (0.9–1.3)	**<.001**
Beta-Blocker	433 (81.5)	1173 (78.3)	.123	226 (83.7)	1380 (78.4)	.056
Amiodarone	283 (59.1)	737 (54.0)	.061	172 (71.1)	848 (52.9)	**<.001**
≥2 antiarrhythmic drugs	110 (23.0)	228 (16.7)	**.003**	66 (27.3)	272 (17.0)	**<.001**
Prior VT ablations	0.0 (0.0–1.0)	0.0 (0.0–1.0)	**.019**	0.0 (0.0–1.0)	0.00 (0.0–1.0)	**.001**
Min–Max	0.0–7.0	0.0–10.0		0.0–6.0	0.0–10.0	

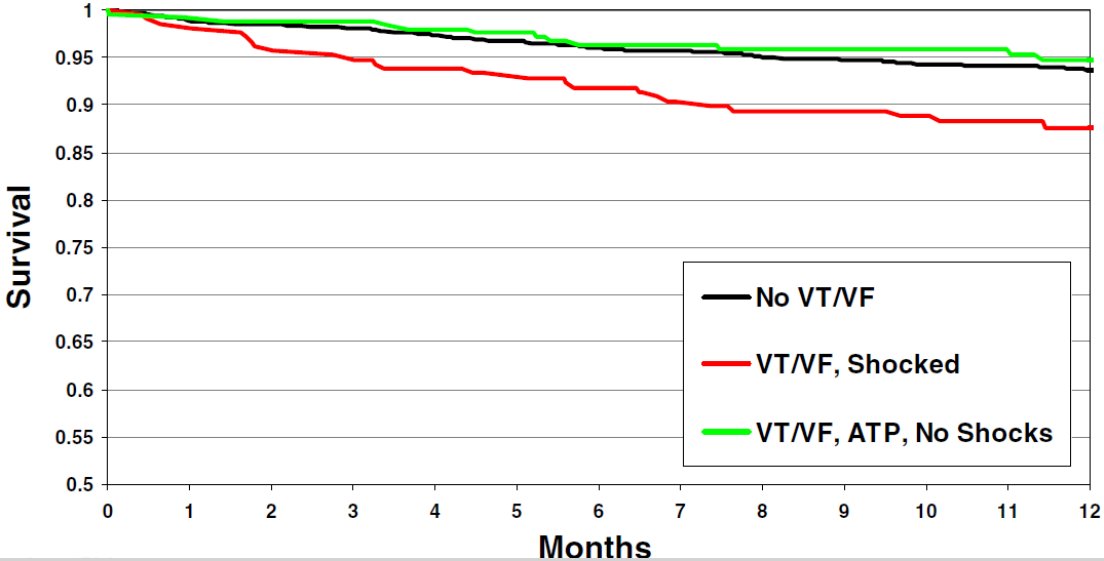
Tung R Heart Rhythm 2015

The Importance of VT in the ICD Era

VT is *still* associated with adverse outcomes…(or at least shocks are)



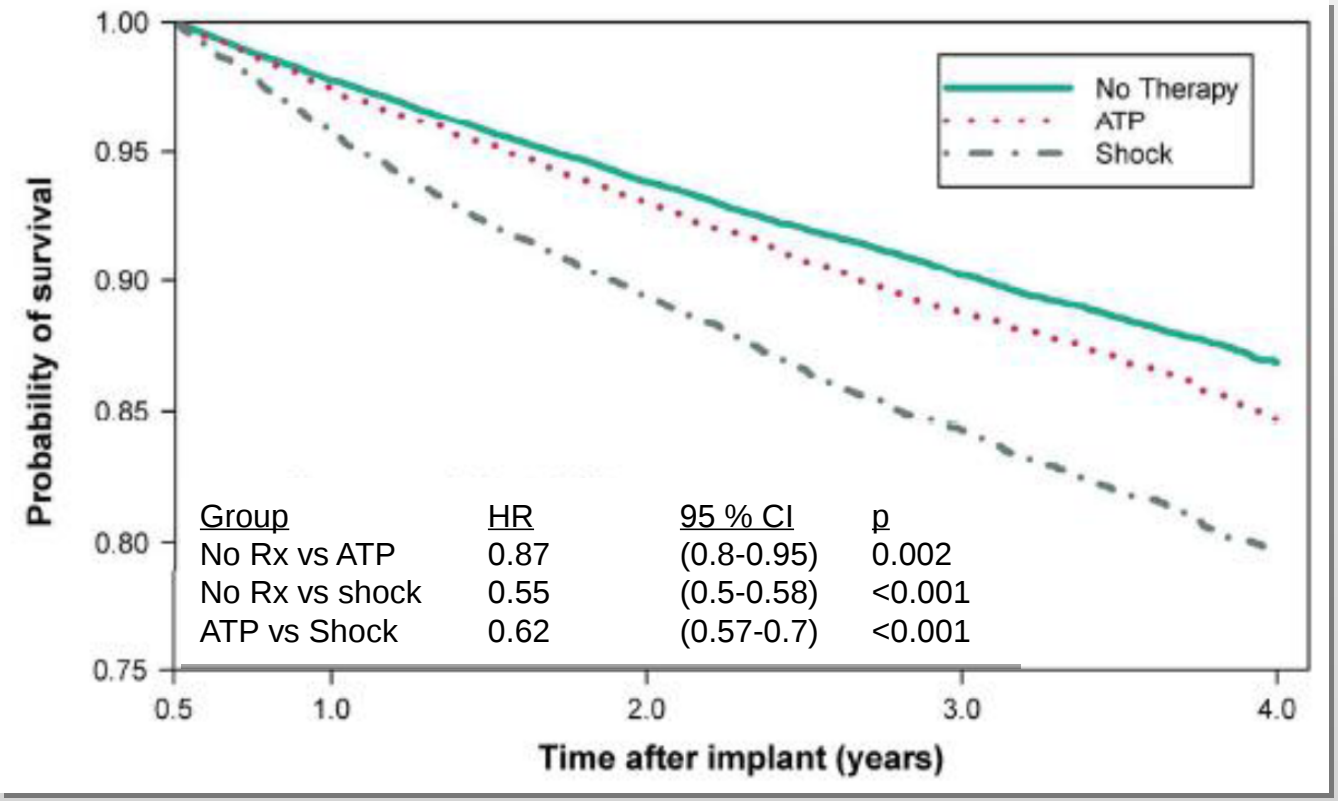
Poole *NEJM* 2008 SCD-HeFT substudy



Sweeney *Heart Rhythm* 2010
PainFREE Rx, PainFREE RxII, Empiric, Prepare

ATP and Shocks reduce Mortality

Data from 69,383 pts with ICDs 2008-13



Group	HR	95 % CI	p
No Rx vs ATP	0.87	(0.8-0.95)	0.002
No Rx vs shock	0.55	(0.5-0.58)	<0.001
ATP vs Shock	0.62	(0.57-0.7)	<0.001

ICD shocks are associated
With reduced mortality

ATP is associated with reduced mortality

Substrate is assoc with reduced mortality

Elimination of VT with catheter ablation may eliminate VT

No evidence VT ablation can change mortality

Strickberger A JCE 2017 (in press)

Reducing Shocks

- “The combination of Long Detection Interval (LDI) and ATP during charging is extremely effective and significantly reduces appropriate but unnecessary therapies
- The use of LDI alone yielded a 39% reduction in appropriate but unnecessary therapies
- ATP on top of LDI determined another 52% reduction in unnecessary shocks”

Europace (2016) 18 (11): 1719-1725

VANISH: Methods

Randomized trial (22 sites)

- Stratified by centre and Amiodarone vs Non-Amiodarone at baseline

Inclusion

- Prior MI
- ICD
- One of the Following VT Events
  - ≥ 3 episodes VT treated with ATP, with symptoms
  - ≥ 1 appropriate ICD shock
  - ≥ 3 VT episodes within 24 hours
  - Sustained VT below programmed ICD detection
- VT Event occurred despite antiarrhythmic drug therapy

Sapp J et al NEJM 2016

Methods: Escalated AAD Arm

Sotalol Amiodarone load then 200 mg/day

Amiodarone <300 Amio reload, then 300 mg/day

Amiodarone ≥300 mg/day Amio + Mexiletine 600 mg/day

Sapp J et al NEJM 2016

Methods: Catheter Ablation

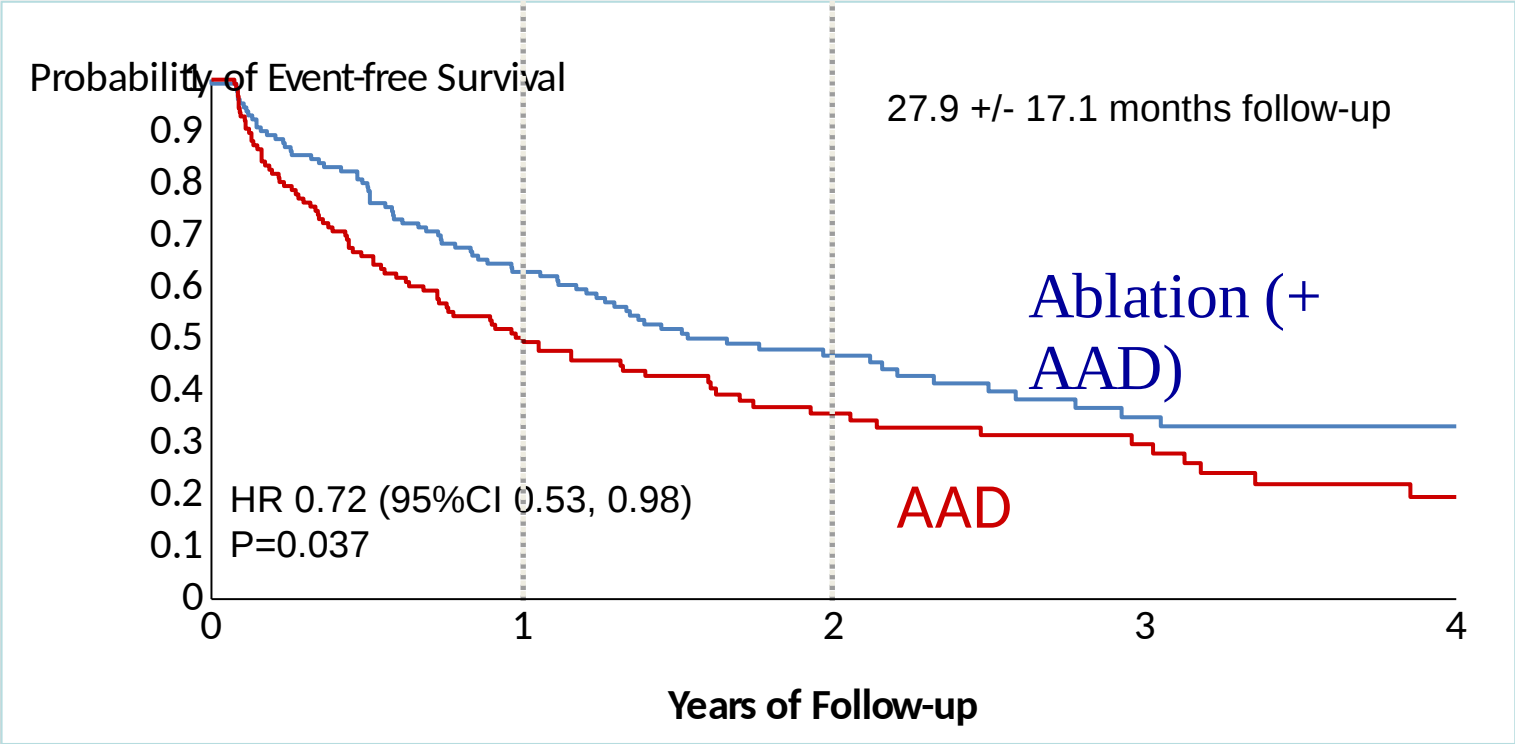
- All inducible VTs targeted for ablation
- Mappable map and ablate
- Unmappable VTs substrate + pace-map
- Non-inducible or Unstable substrate/LAVA/latency
- Endpoint of no-inducible VT

- **Patients remained on baseline antiarrhythmic drug therapy**

Sapp J et al NEJM 2016

Results: Primary Outcome

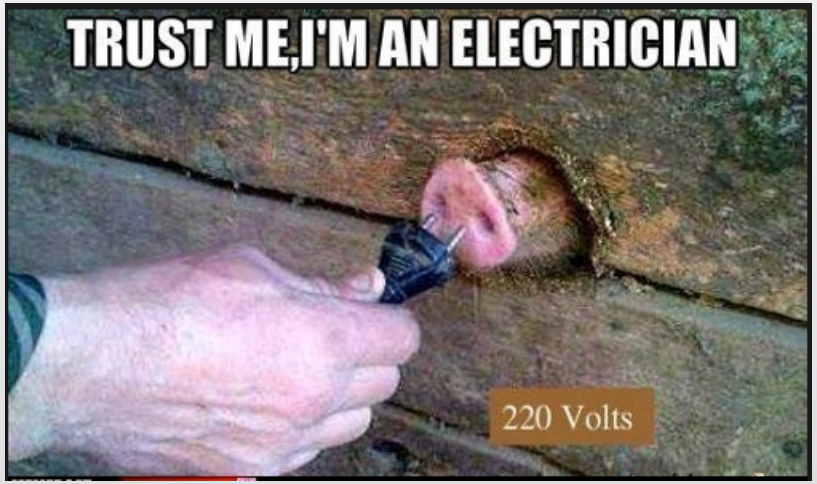
Composite: Death, VT Storm 30d, Appropriate Shock



No. at Risk					
Ablation	132	80	40	20	8
AAD	127	61	25	17	6

Summary

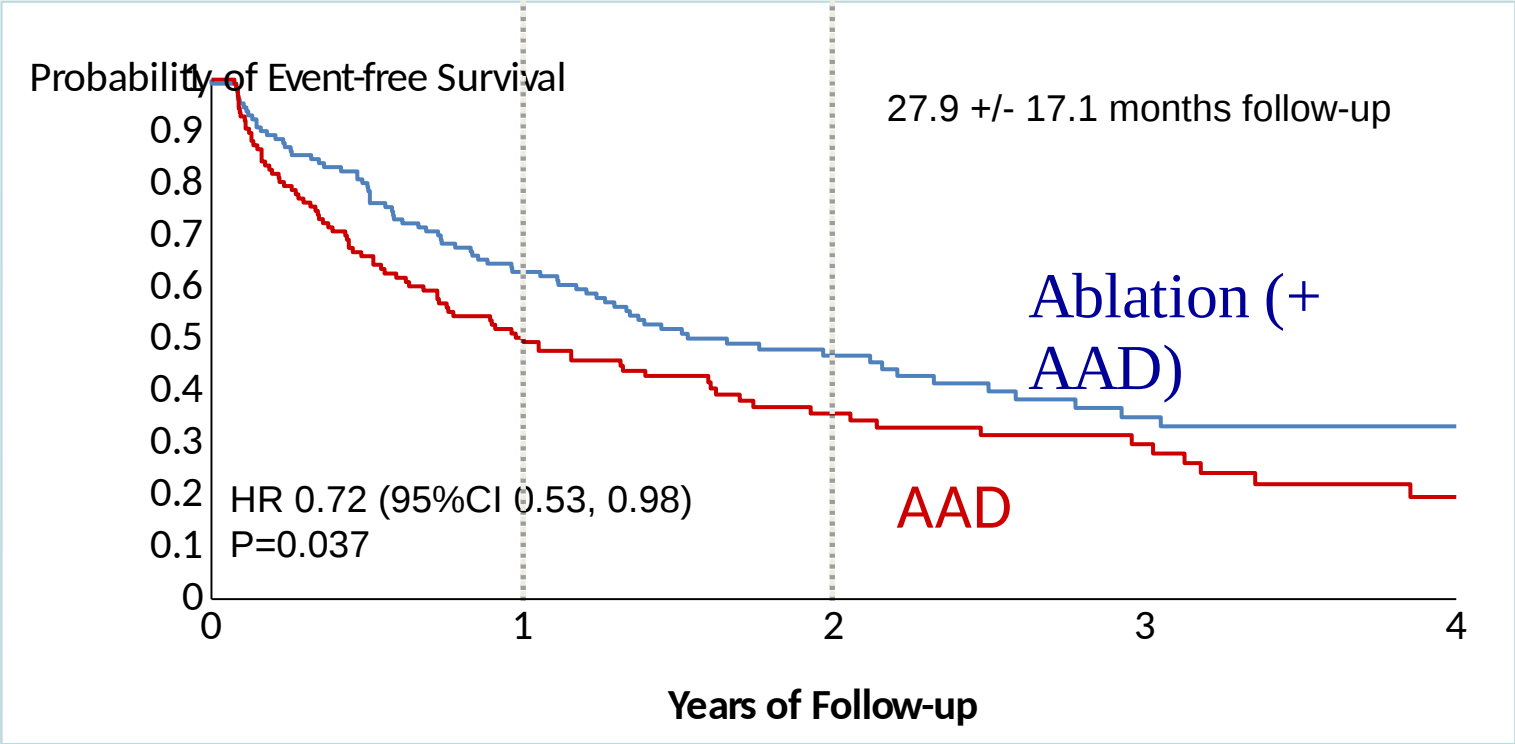
- ICD is mainstay of Rx
  - No evidence VT ablation will reduce SCD, VF or any hard endpoint except VT (in some)
- Sicker patients have:
  - More VT (ATP and shocks)
  - Higher mortality
  - Lower ablation success rates
  - VT ablation does not change mortality
- Successful ablation is a marker for less sick patients
- Despite successful ablation VT often recurs
  - Adjuvant palliative therapy



Not the plumber

Results: Primary Outcome

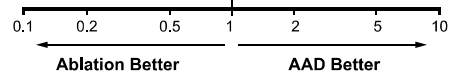
Composite: Death, VT Storm 30d, Appropriate Shock



No. at Risk					
Ablation	132	80	40	20	8
AAD	127	61	25	17	6

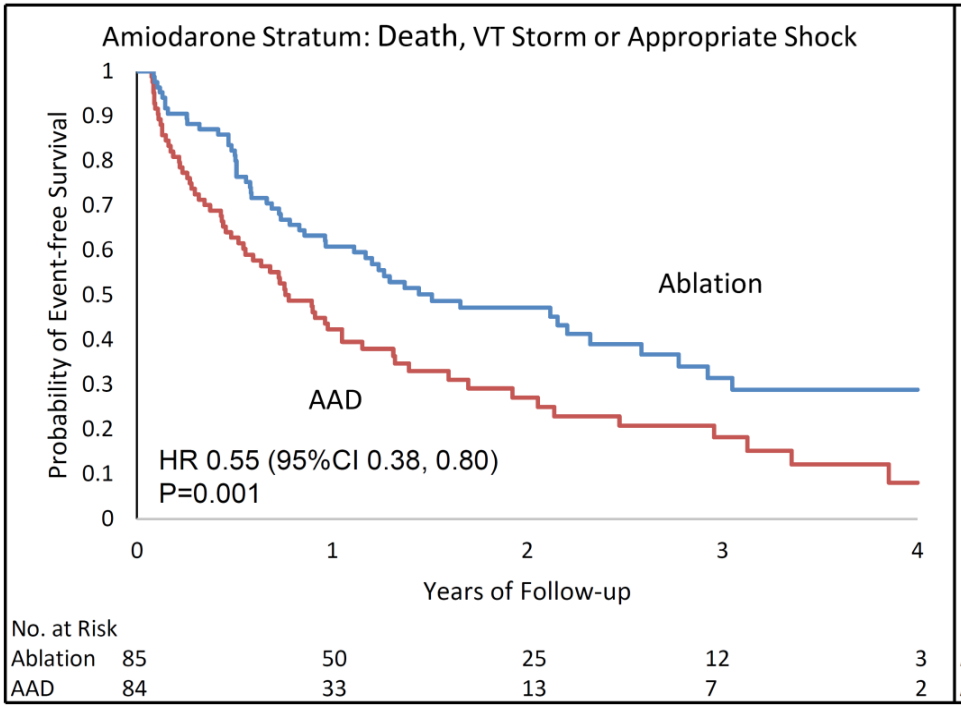
Results: Subgroups

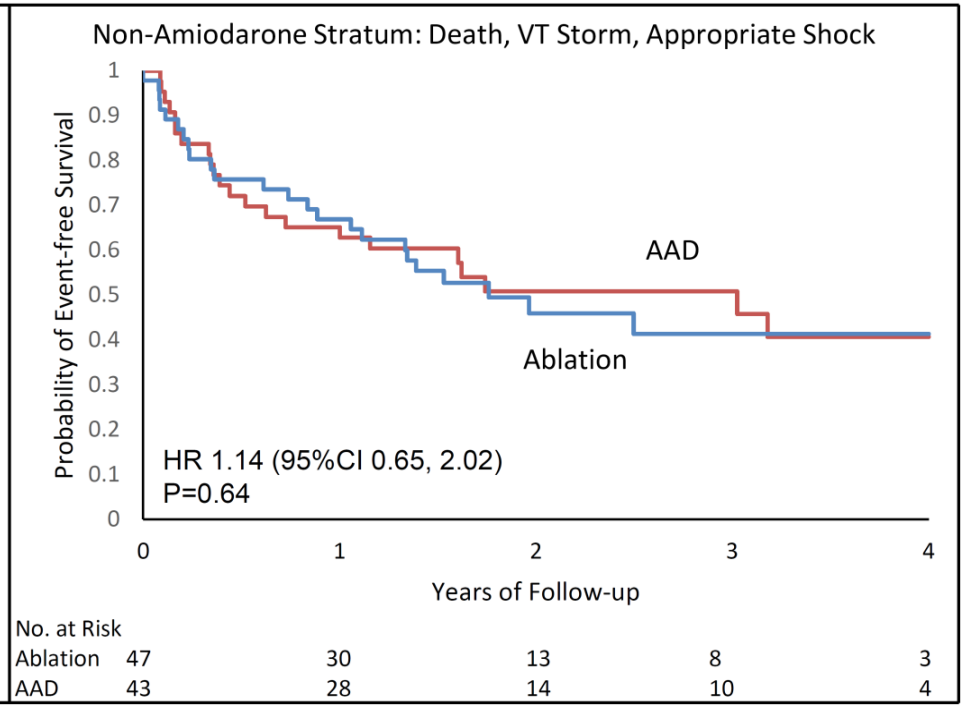
Subgroup	Ablation	AAD	Hazard Ratio (95% CI)	P Value for Interaction
	no. of patients with event/total no. of patients (%)			
Baseline antiarrhythmic				0.03
Amiodarone	52/85 (61.2)	65/84 (77.4)	0.55 (0.38,0.80)	
Non-amiodarone	26/47 (55.3)	22/43 (51.2)	1.14 (0.65,2.02)	
Ejection fraction				0.26
<30%	35/55 (63.6)	46/59 (78.0)	0.62 (0.40,0.97)	
ICD shock within 3 months				0.76
Yes	51/84 (60.7)	61/81 (75.3)	0.70 (0.48,1.02)	
No	27/48 (56.3)	26/46 (56.5)	0.79 (0.46,1.35)	
Sex				0.66
Male	74/123 (60.2)	80/118 (67.8)	0.74 (0.54,1.01)	
Female	4/9 (44.4)	7/9 (77.8)	0.59 (0.16,2.13)	
Age				0.30
<70 yr	47/78 (60.3)	32/53 (60.4)	0.88 (0.56,1.38)	
≥70 yr	31/54 (57.4)	55/74 (74.3)	0.61 (0.39,0.94)	
NT-proBNP				0.51
<550 pg/ml	19/40 (47.5)	23/37 (62.2)	0.63 (0.34,1.16)	
≥550 pg/ml	25/35 (71.4)	32/42 (76.2)	0.83 (0.49,1.41)	
QRS duration				0.70
<150 msec	34/63 (54.0)	35/57 (61.4)	0.80 (0.50,1.28)	
≥150 msec	41/63 (65.1)	45/61 (73.8)	0.69 (0.45,1.06)	
Index arrhythmia event				0.35
ATP	8/14 (57.1)	7/20 (35.0)	1.45 (0.52,4.01)	
Shock	47/74 (63.5)	47/61 (77.0)	0.69 (0.46,1.04)	
VT storm	5/12 (41.7)	16/20 (80.0)	0.47 (0.17,1.30)	
VT below defect	18/32 (56.3)	17/26 (65.4)	0.66 (0.34,1.29)	
Location of MI				0.78
Anterior	14/24 (58.3)	11/14 (78.6)	0.75 (0.45,1.28)	
Not anterior	52/82 (63.4)	58/90 (64.4)	0.89 (0.61,1.29)	
Atrial fibrillation				0.75
Atrial fibrillation/flutter	30/52 (57.7)	29/47 (61.7)	0.88 (0.53,1.46)	
No atrial fibrillation	48/80 (60.0)	58/80 (72.5)	0.65 (0.44,0.96)	
All patients			0.72 (0.53,0.98)	



Only significant interaction was the baseline antiarrhythmic drug (amiodarone vs. non-amiodarone)

Results: Baseline antiarrhythmic drug strata





Treatment-Attributable Adverse Events

Event	AAD Group (n=127) No. (%)	Catheter Ablation Group (n=132) No. (%)	P
Catheter Ablation Related			
Vascular injury		3 (2.3)	0.25
Major Bleeding	1 (0.8)	3 (2.3)	0.62
Cardiac Perforation	1 (0.8)	2 (1.5)	1.00
Endocarditis	1 (0.8)		0.49
Heart Block	1 (0.8)		0.49
Antiarrhythmic Drug Related			
Death			
Pulmonary toxicity	2 (1.6)		0.24
Liver toxicity/multiorgan failure	1 (0.8)		0.49
Pulmonary Infiltrate	2 (1.6)		0.24
Shortness of Breath	3 (2.4)	1 (0.8)	0.36
Heart Failure Admission	1 (0.8)	3 (2.3)	0.62
Hyperthyroidism	5 (3.9)	3 (2.3)	0.49
Hypothyroidism	5 (3.9)	2 (1.5)	0.27
Hepatic Dysfunction	6 (4.7)		0.013
Tremor/Ataxia	6 (4.7)		0.013
SFX Leading To Drug Therapy Change	6 (4.7)		0.013
Other adverse events, no. (%)	6 (4.7)	4 (3.0)	0.53

Conclusion

Catheter ablation is superior to escalation of antiarrhythmic drug therapy…

WHEN AMIODARONE FAILS

…for reducing the combined endpoint of death, appropriate shock, and VT storm, driven by reductions in VT storm and shock.

Priorities for 2° Prevention

1. ICD with Painfree II / appropriate programming

2. If VT… start amiodarone

   (Sotalol can be used an intermediate step if good EF)

3. If VT on Amio (slower and better tolerated) …

   Or S/E on Amio (needs discontinuation) … catheter ablation…

4. Repeat catheter ablation…

Next Steps

- VANISH-2 Pilot Study

Results: Baseline Characteristics

	Antiarrhythmic Drug N=127	Catheter Ablation N=132
Age (yr)	70.3 ± 7.3	67.0 ±8.6
Male	118 (92.9%)	123 (93.2%)
Diabetes—no.(%)	40 (31.5)	37 (28.0)
Hypertension –no.(%)	88 (69.3)	92 (69.7)
Renal Insufficiency –no.(%)	26 (20.5)	23 (17.4)
Atrial Fibrillation or Atrial flutter – no.(%)	47 (37.0)	52 (39.4)
Functional Class		
NYHA FC I –no.(%)	28 (22.0)	33 (25.0)
NYHA FC II –no.(%)	68 (53.5)	69 (52.3)
NYHA FC III –no.(%)	31 (24.4)	30 (22.7)

Results: Baseline Characteristics

	Antiarrhythmic Drug N=127	Catheter Ablation N=132
Ejection Fraction—%	31.2 ± 10.7	31.1 ± 10.4
Single Chamber ICD—no.(%)	44 (34.7)	43 (32.6)
Dual Chamber ICD—no.(%)	61 (48.0)	60 (45.5)
CRT Defibrillator—no.(%)	22 (17.3)	29 (22.0)
Estimated GFR (Cockroft-Gault)	70.2 ± 26.4	75.8 ± 29.0
Sodium (mmol/L)	138.4 ± 3.4	138.5 ± 3.0
Potassium (mmol/L)	4.3 ± 0.4	4.3 ± 0.4
NT-proBNP (pg/mL)	937.3 ± 895.5	1010.3 ± 1252.7

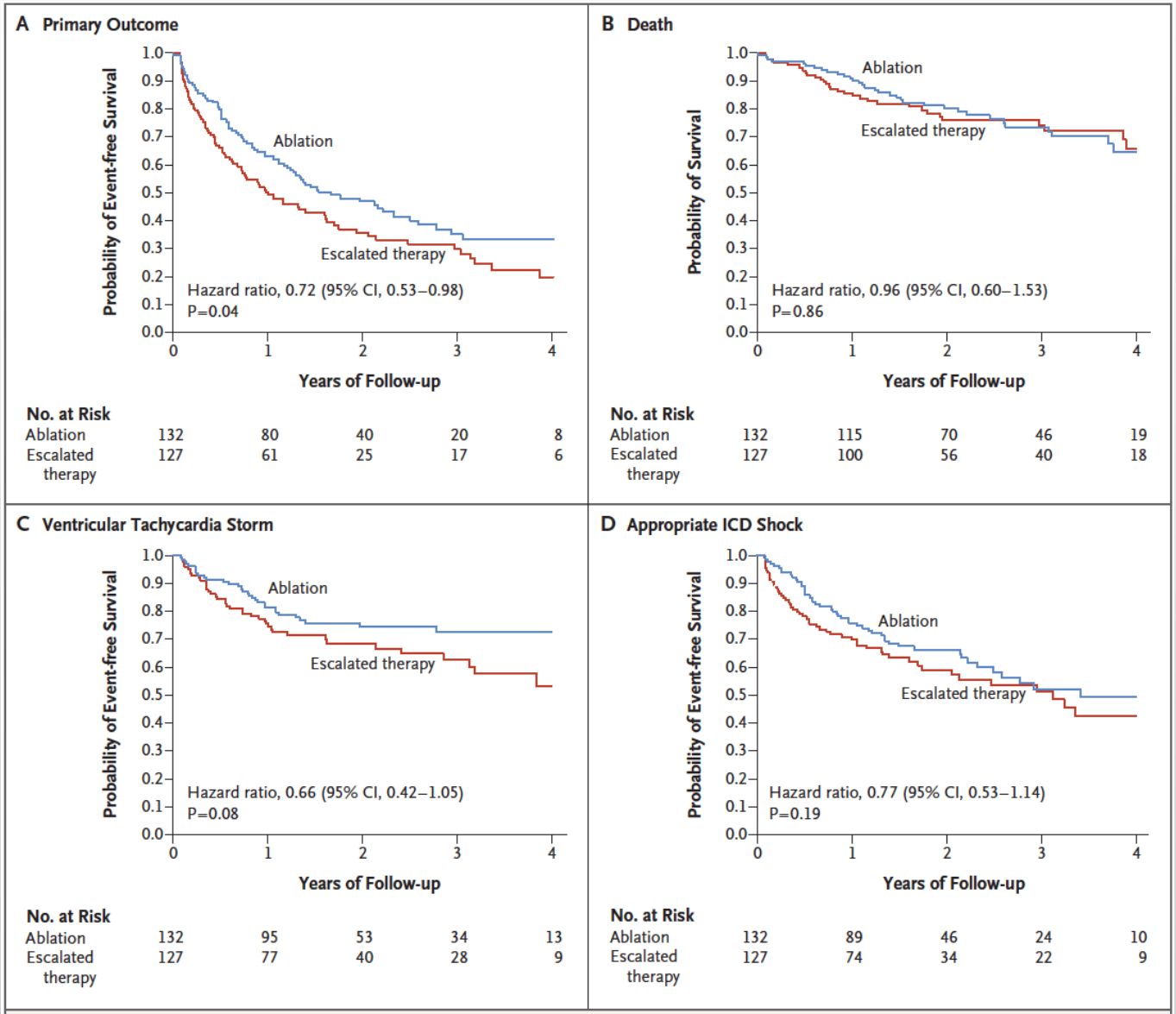
Results: Baseline Characteristics

	Antiarrhythmic Drug N=127	Catheter Ablation N=132
Antiarrhythmic Drug At Time of Qualification:		
Non Amiodarone – no.(%)	43 (33.9)	47 (35.6)
Sotalol – no.(%)	43 (33.9)	46 (34.8)
Procainamide – no.(%)	0	1 (0.76)
Amiodarone–no.(%)	84 (66.1)	85 (64.4)
Dose < 300 mg/day	73 (57.5)	77 (58.3)
Dose ≥300 mg/day –no.(%)	11 (8.7)	8 (6.1)

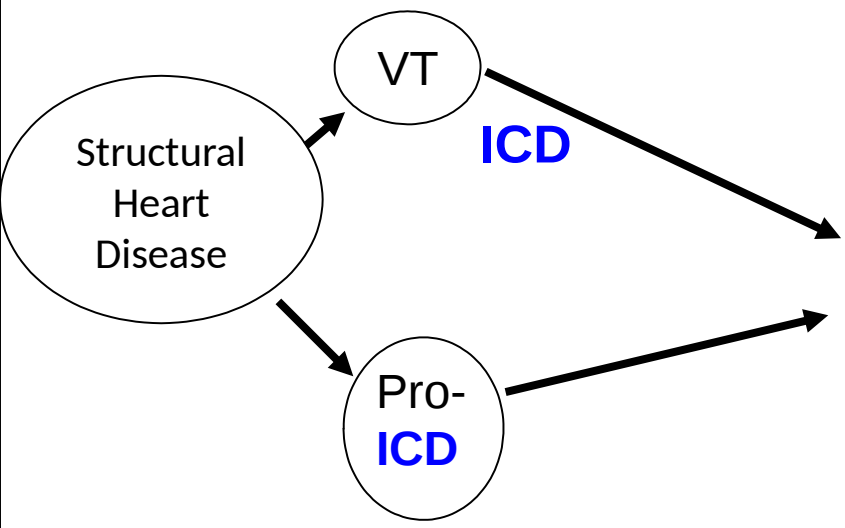
Results: Baseline Characteristics

	Antiarrhythmic Drug N=127	Catheter Ablation N=132
Other Medications		
Beta-blocker – no.(%)	122 (96.1)	124 (93.9)
ACE Inhibitor –no.(%)	83 (65.4)	86 (64.4)
ARB –no.(%)	28 (22.1)	31 (23.5)
Diuretic – no.(%)	89 (70.1)	90 (68.2)
Digoxin – no.(%)	25 (19.7)	27 (20.5)
Aspirin – no.(%)	85 (75.9)	99 (83.9)
Calcium channel blocker – no.(%)	19 (15.0)	14 (10.6)
Warfarin – no.(%)	42 (37.5)	47 (39.5)
Non-warfarin anticoagulant –no.(%)	12 (9.5)	11 (8.3)

Results: Components of Primary Outcome



Pending Studies



Recurrent VT with ICD

Storm

Shocks

Symptomatic ATP

VANISH

Ablation vs Aggressive Drug Therapy

Drug refractory

MANTRA VT

PARTITA

VANISH 2

INTERVENE

PAUSE-SCD

Ablation vs Amiodarone

Drug naive

VA2NISH

This is a very difficult area to study

- CEASE-VT
- ASPIRE
- CALYPSO
- STAR-VT

CONTEMPORARY REVIEW

Catheter ablation of ventricular tachycardia: Lessons learned from past clinical trials and implications for future clinical trials

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VA2NISH

VANISH2 Pilot: Funding

- Biosense Webster
- St. Jude Medical

- Heart and Stroke Foundation

HEART & STROKE FOUNDATION™

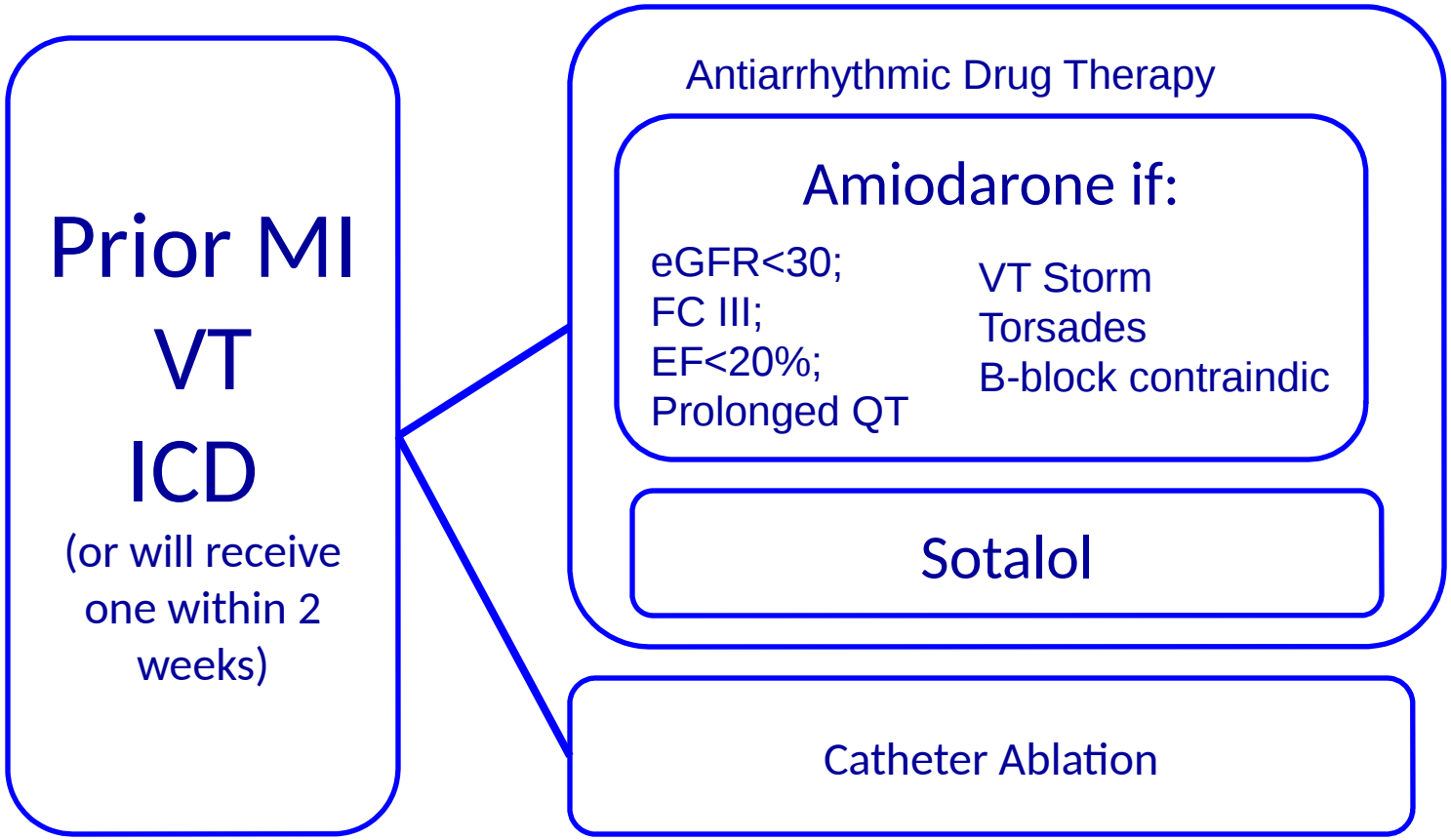
VA2NISH

Need for the trial

- National survey
- Named as a priority in multiple consensus documents (2006 AHA/ACC/ESC; 2009 HRS/EHRA; 2014 EHRA/HRS/APHRS)
- Patient Focus Groups

VA2NISH

Trial Design



VA2NISH

Sample size

- Pilot: 75 patients
- Main trial 330 patients

VA2NISH

Acknowledgements

Executive Committee: John L. Sapp, Anthony S. Tang, George A. Wells, Ratika Parkash, William G. Stevenson

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Stanley Tung, University of British Columbia
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Anthony S L Tang, Victoria Cardiac Arrhythmia Trials
George Veenhuyzen, Libin Cardiovascular Institute of Alberta
Jeff Healey, Hamilton Health Sciences Centre
Damian Redfearn, Kingston General Hospital
Jean-Francois Roux, Centre Hospitalier Universitaire de Sherbrooke
Yaariv Khaykin, Southlake Regional Health Centre
Katja Zeppenfeld, Leiden University Medical Center
Tomasz Hruczkowski, Mazankowski Alberta Heart Institute
Vance Plumb, University of Alabama at Birmingham
Kurt Roberts-Thomson, Royal Adelaide Hospital
Jens Seiler, University Hospital, Bern
Sheldon Singh, Sunnybrook Health Sciences Centre
Andrew Ha, Toronto General Hospital
Saman Nazarian, Johns Hopkins University.

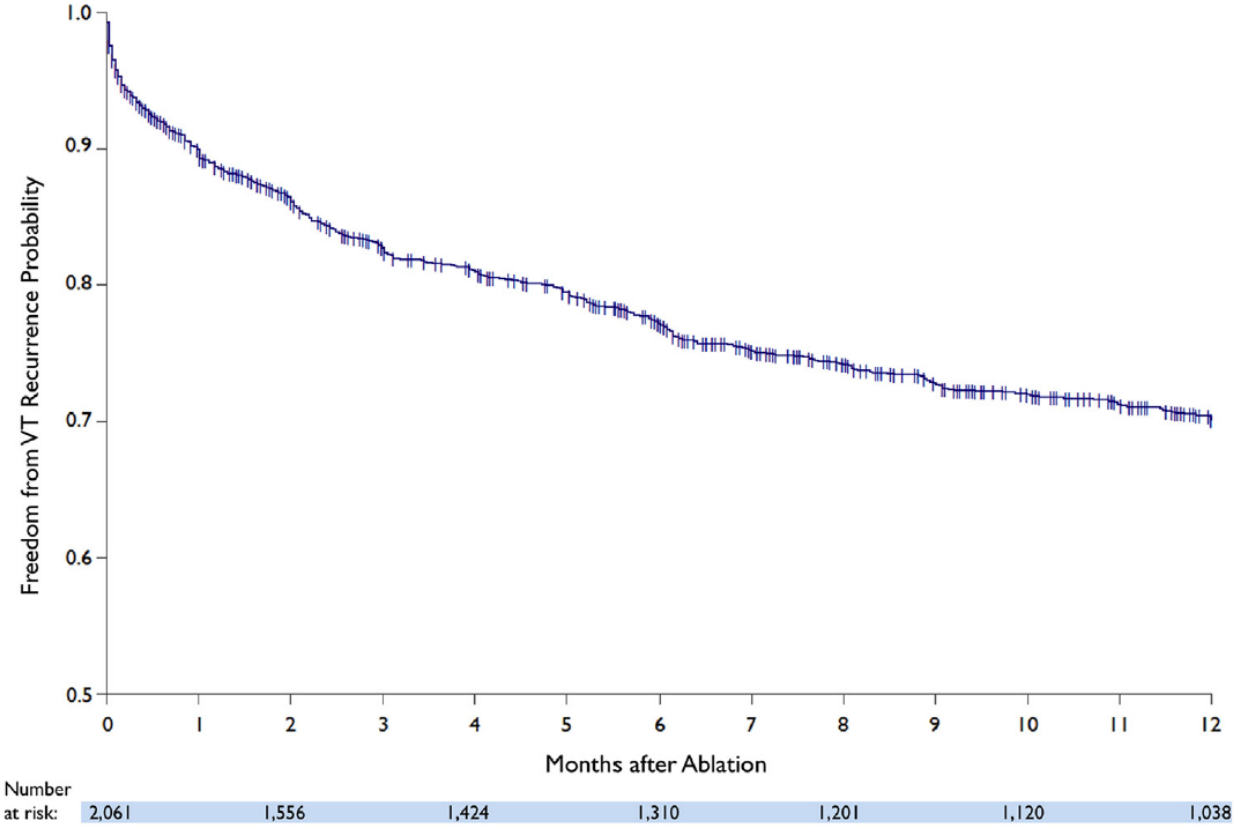


Figure 1 Kaplan–Meier estimate of freedom from ventricular tachycardia (VT) in the overall cohort.

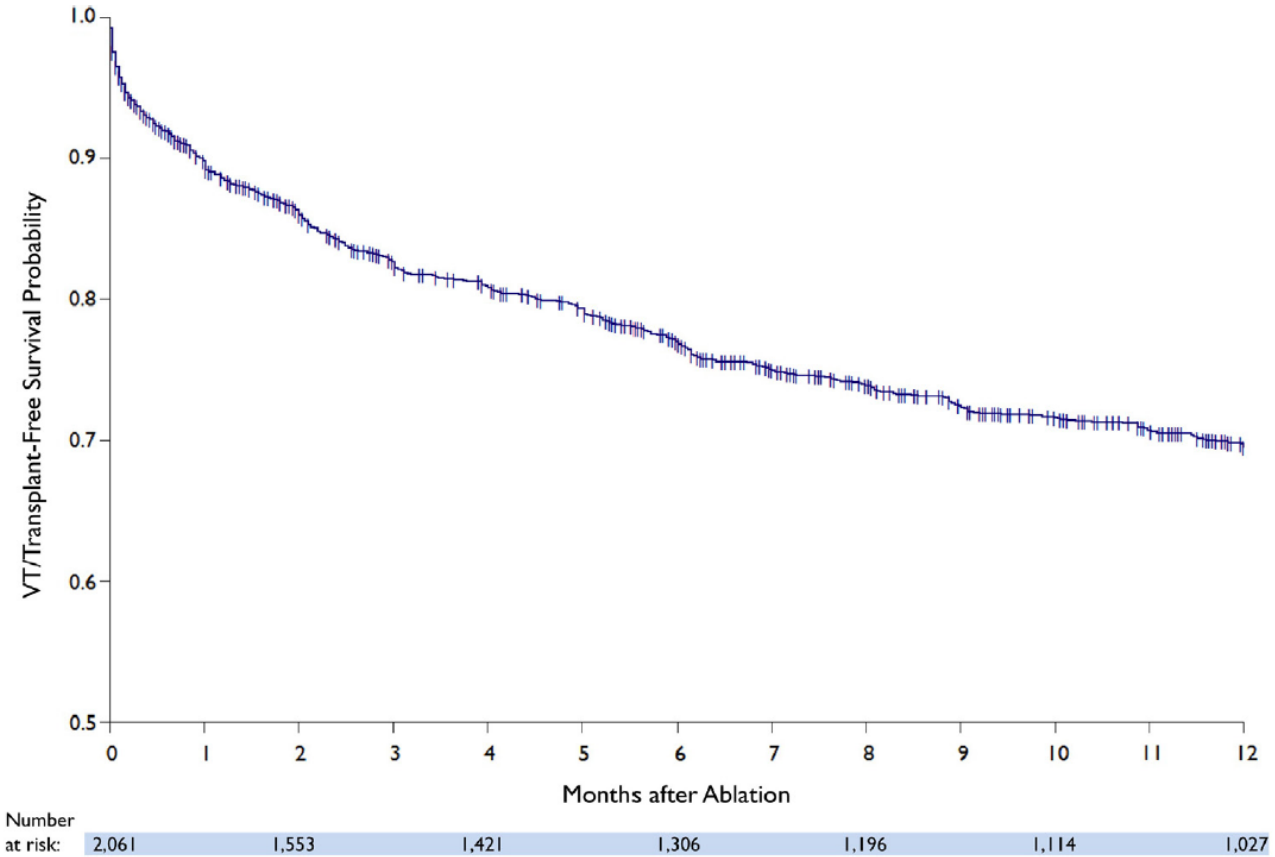
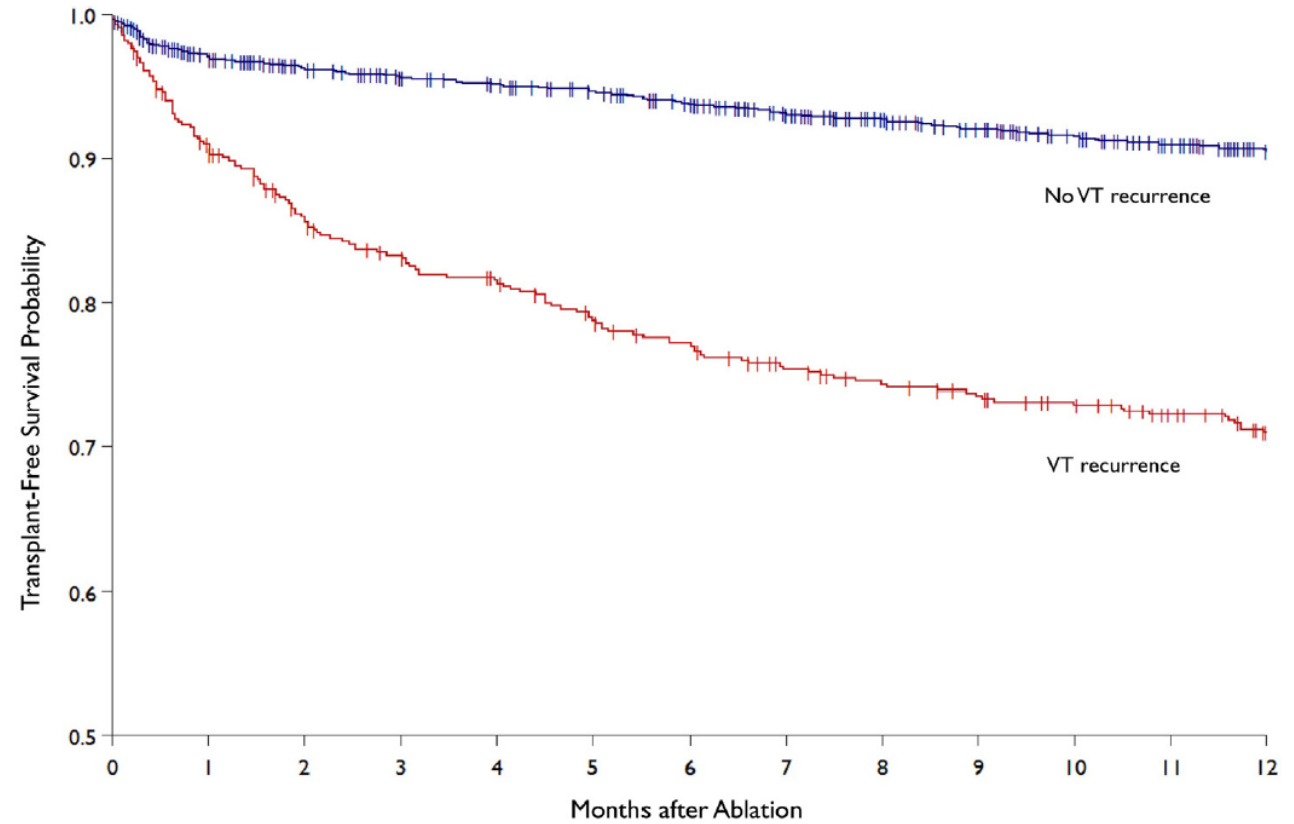
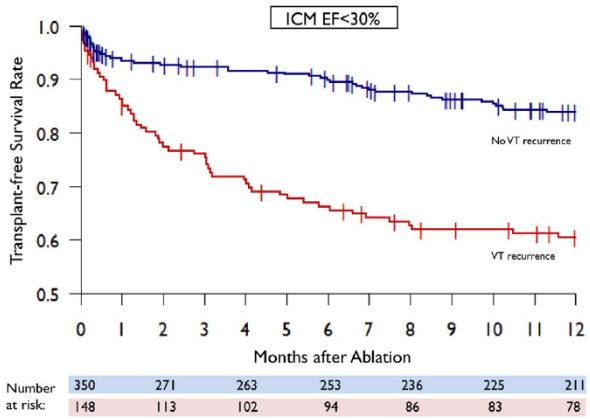
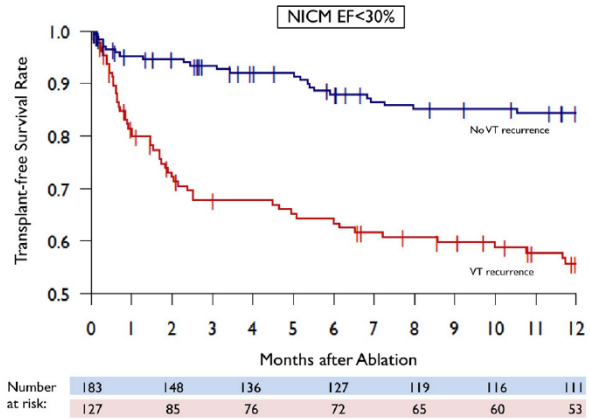


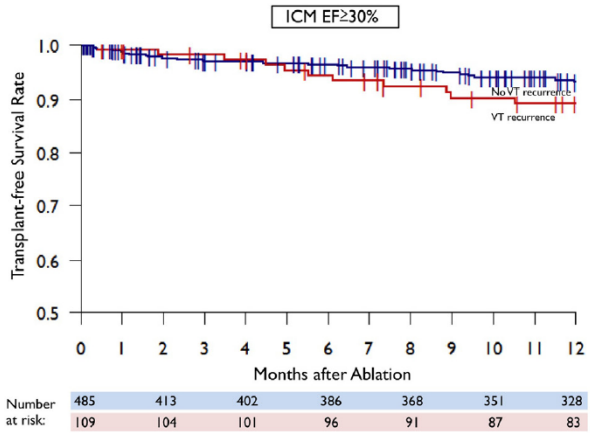
Figure 2 Kaplan–Meier estimate of ventricular tachycardia (VT) and transplant-free survival in the overall cohort.

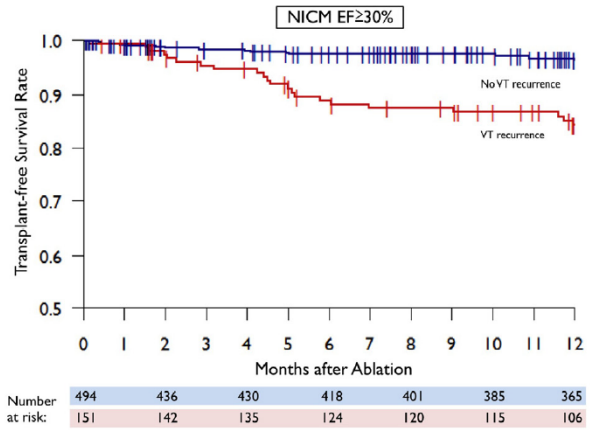


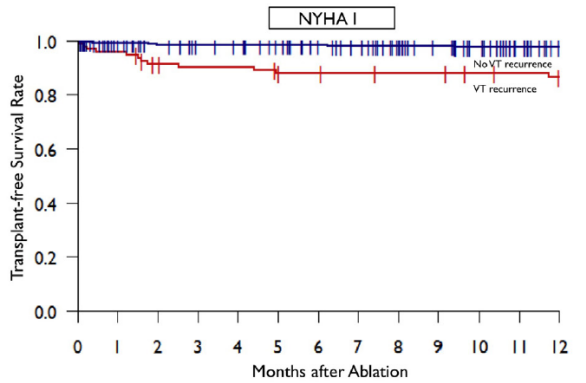
Number at risk:							
	1,525	1,278	1,241	1,194	1,134	1,087	1,024
	536	445	415	387	363	346	321


ICM EF<30%
Transplant-free Survival Rate
1.0
0.9
0.8
0.7
0.6
0.5
No VT recurrence
VT recurrence
0 1 2 3 4 5 6 7 8 9 10 11 12
Months after Ablation
Number at risk:
350 271 263 253 236 225 211
148 113 102 94 86 83 78

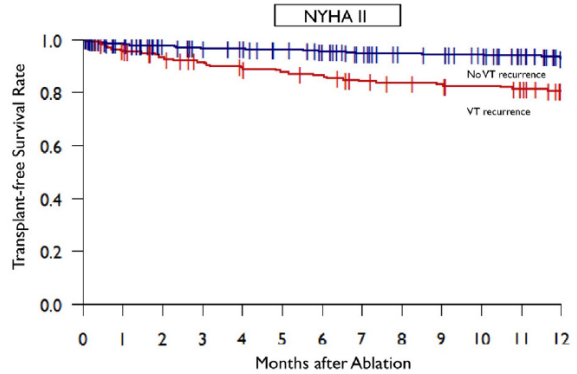

NICM EF<30%
Transplant-free Survival Rate
1.0
0.9
0.8
0.7
0.6
0.5
No VT recurrence
VT recurrence
0 1 2 3 4 5 6 7 8 9 10 11 12
Months after Ablation
Number at risk:
183 148 136 127 119 116 111
127 85 76 72 65 60 53


ICM EF≥30%
Transplant-free Survival Rate
1.0
0.9
0.8
0.7
0.6
0.5
No VT recurrence
VT recurrence
0 1 2 3 4 5 6 7 8 9 10 11 12
Months after Ablation
Number at risk:
485 413 402 386 368 351 328
109 104 101 96 91 87 83

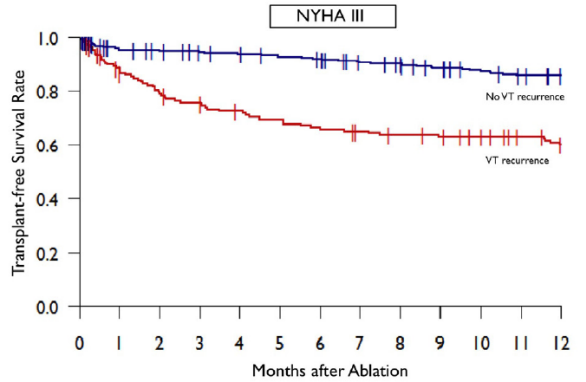

NICM EF≥30%
Transplant-free Survival Rate
1.0
0.9
0.8
0.7
0.6
0.5
No VT recurrence
VT recurrence
0 1 2 3 4 5 6 7 8 9 10 11 12
Months after Ablation
Number at risk:
494 436 430 418 401 385 365
151 142 135 124 120 115 106



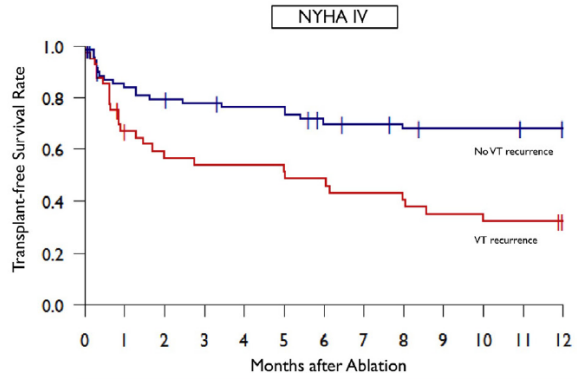
Number at risk:	466	396	388	373	357	342	322
	92	81	79	75	73	71	69



Number at risk:	525	437	424	410	390	383	357
	193	172	160	153	143	138	127

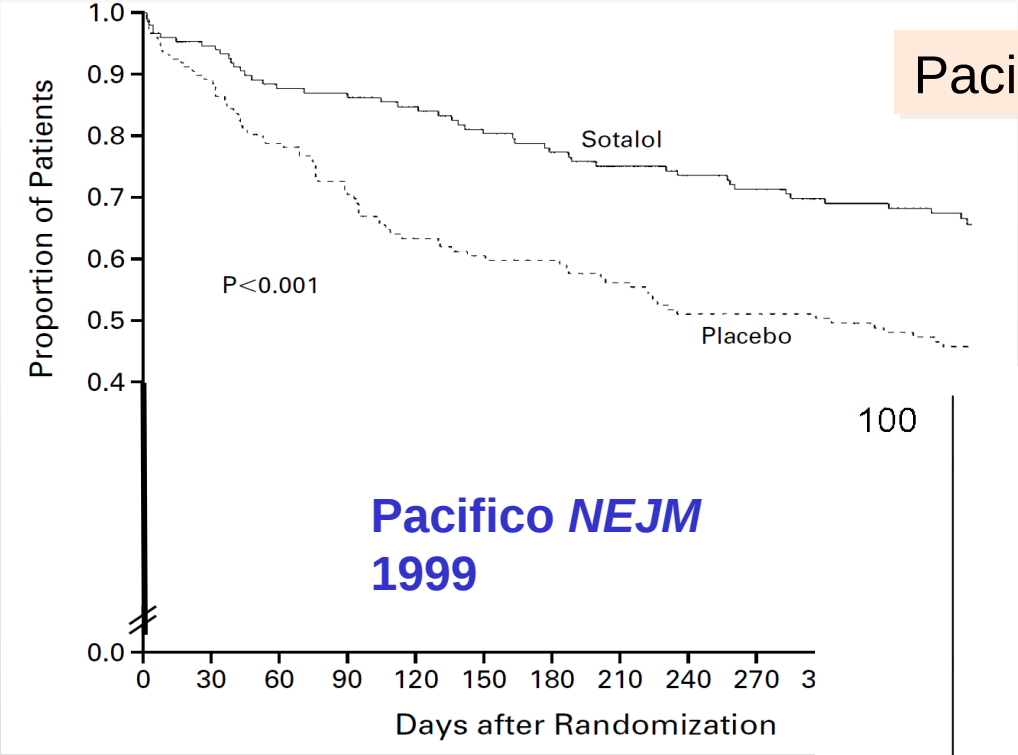


Number at risk:	372	307	297	287	272	254	244
	164	125	111	102	95	90	80



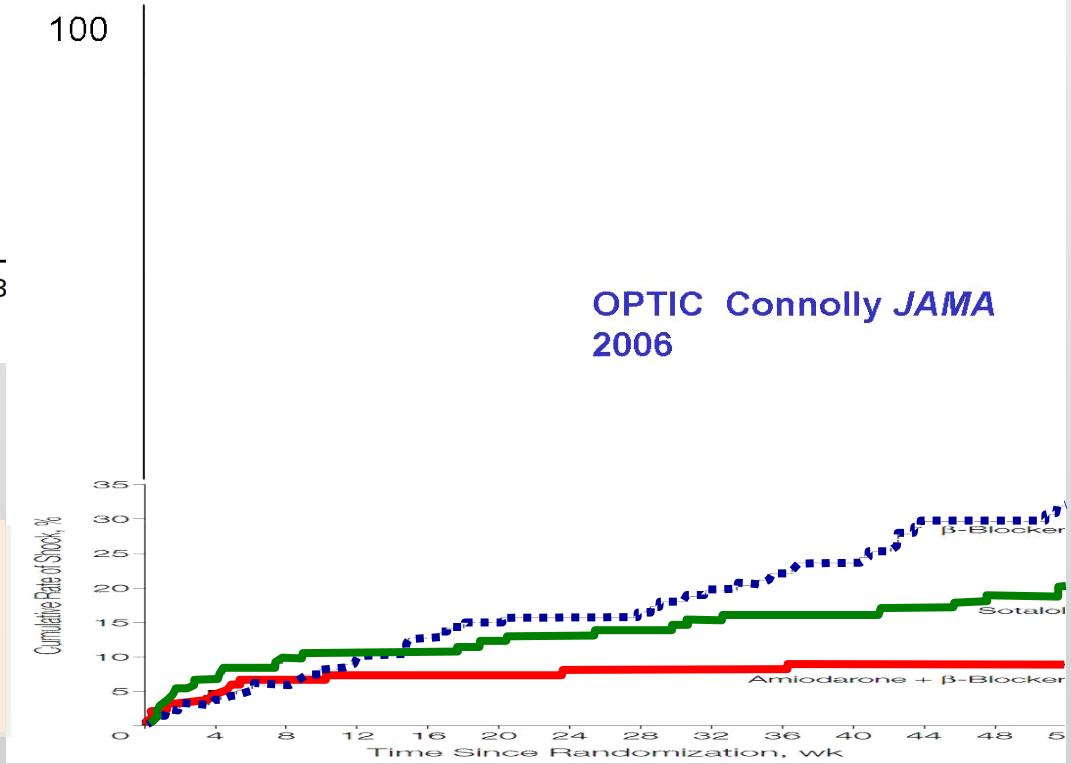
Number at risk:	71	53	49	43	40	38	37
	40	22	20	18	15	12	11

Sotalol Amiodarone



Pacifico: Sotalol 44% RR

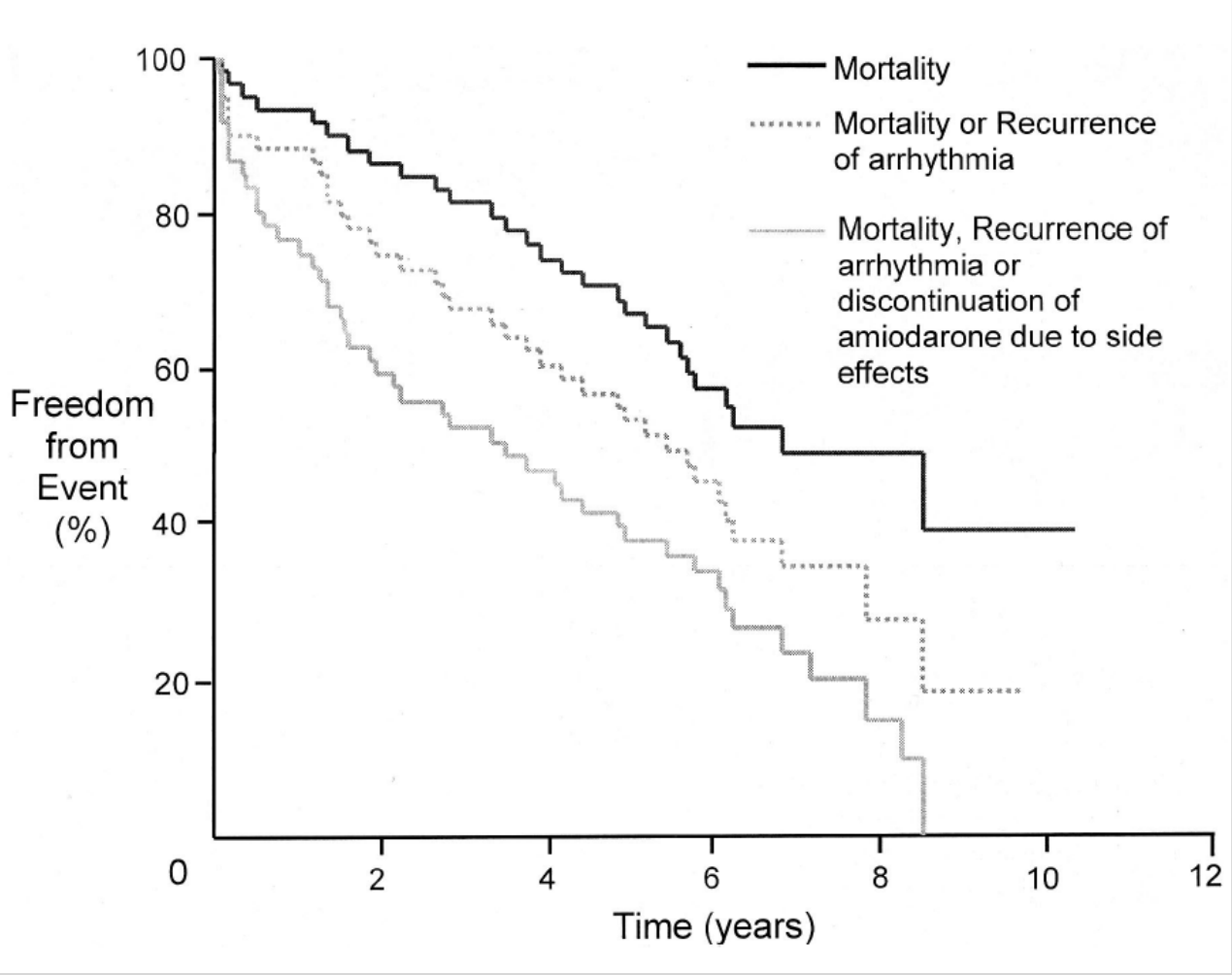
Pacifico *NEJM* 1999



OPTIC Connolly *JAMA* 2006

Connolly:
Sotalol 40% RRR,
Amio 73% RR

Side-effects



Long-term amiodarone treatment (CIDS f/u)

82% of pts had amio SFX

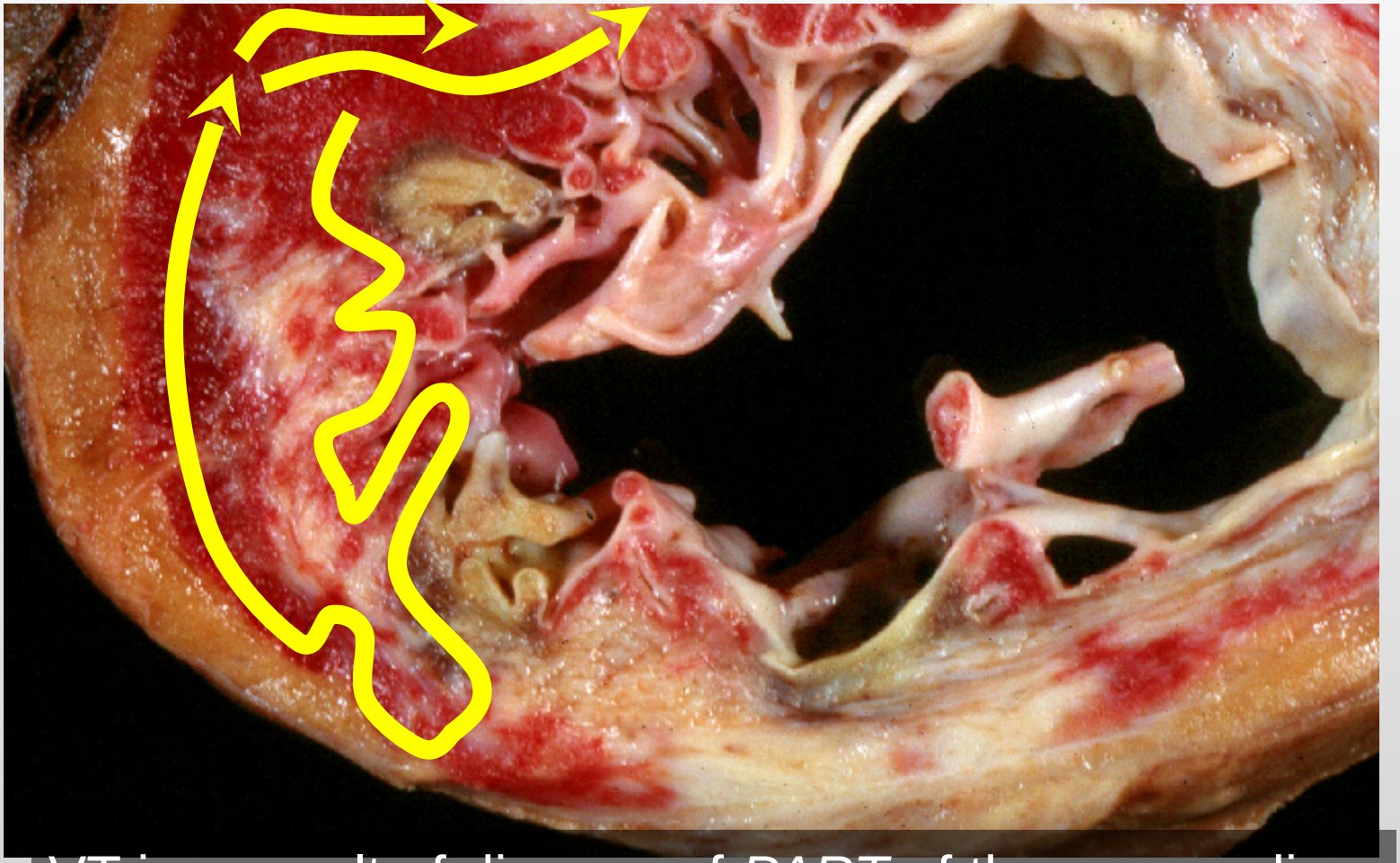
50% requiring dose reduction

22% serious

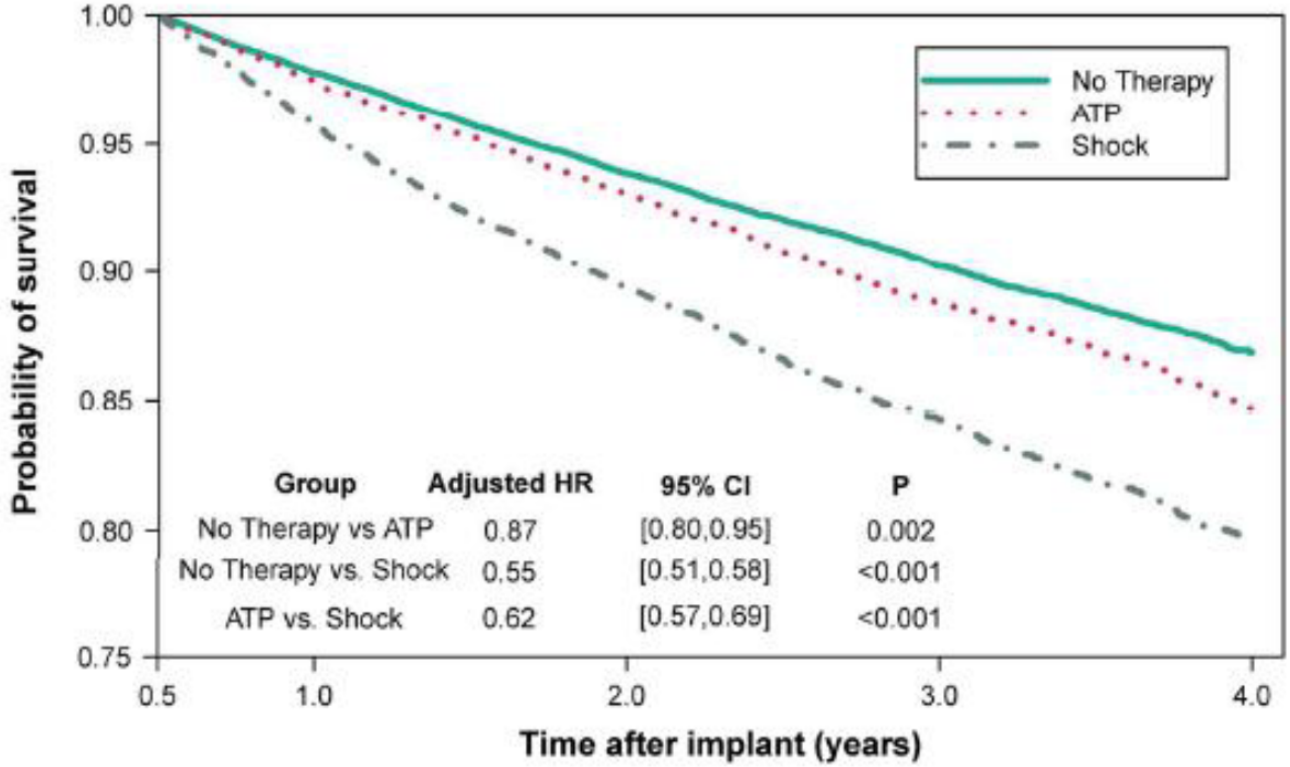
Bokhari *Circulation*, 2004

VT Reduction: Catheter Ablation

Stevenson



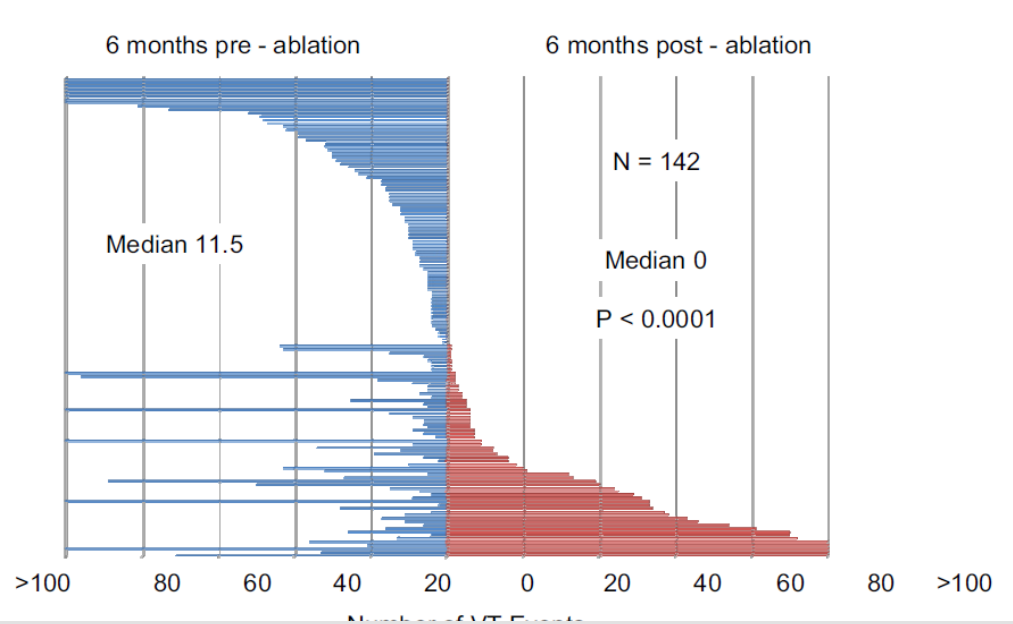
VT is a result of disease of *PART* of the myocardium

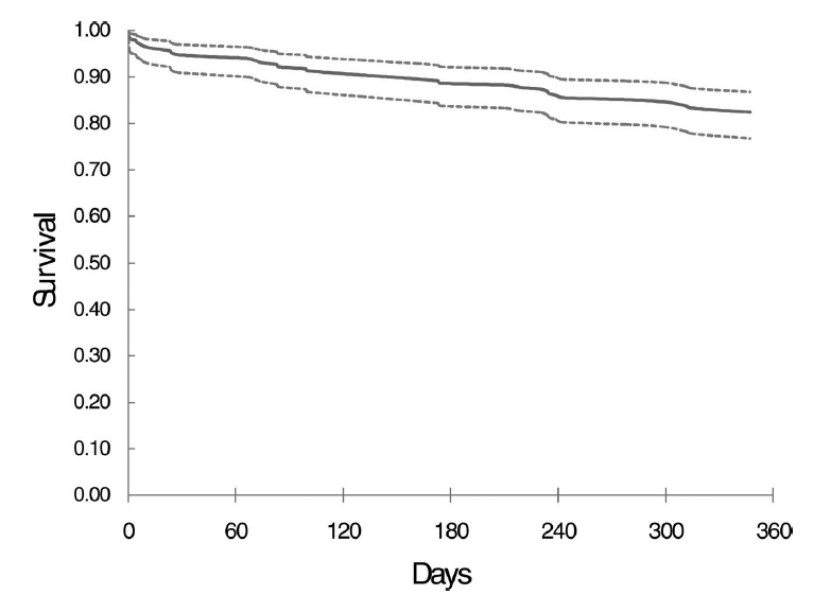


No Therapy	57913	43485	25607	12882	4526
ATP	4726	5316	4577	2641	942
Shock	6729	7838	7194	4636	1923
Patients with event					
No Therapy	0	1143	2548	3287	3606
ATP	0	133	374	547	622
Shock	0	326	861	1215	1400

Thermocool Study

Stevenson et al, *Circulation*, 2008



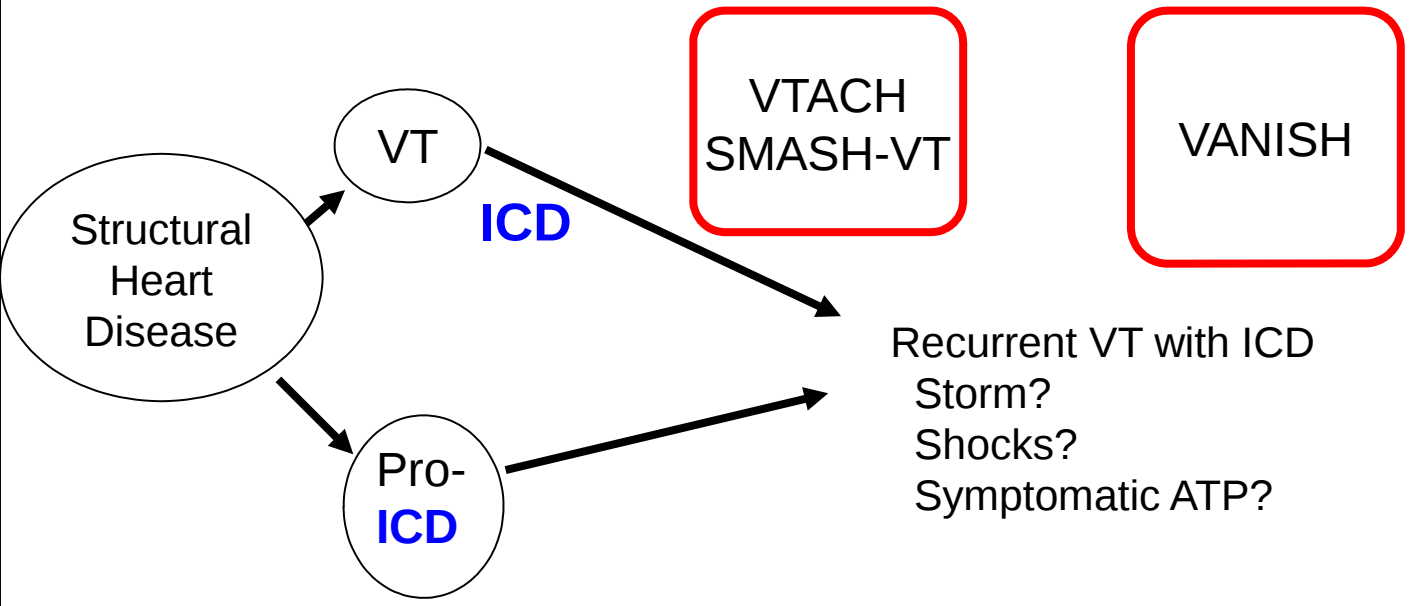


Survival Curve

Ablation Evidence And Trials

Randomized Trials

- SMASH-VT (Reddy *NEJM* 2007)
- V-Tach (Kuck *Lancet* 2010)



Ablation vs Aggressive Drug Therapy
Drug refractory

Ablation vs Amiodarone
Antiarrhythmic Drug naive

Ablation vs no therapy

VANISH Trial

- Multicentre, multinational randomized trial (22 sites)

- Canadian Institutes of Health Research
- Unrestricted Research Grants: St. Jude Medical, Biosense Webster

CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

VANISH: Methods

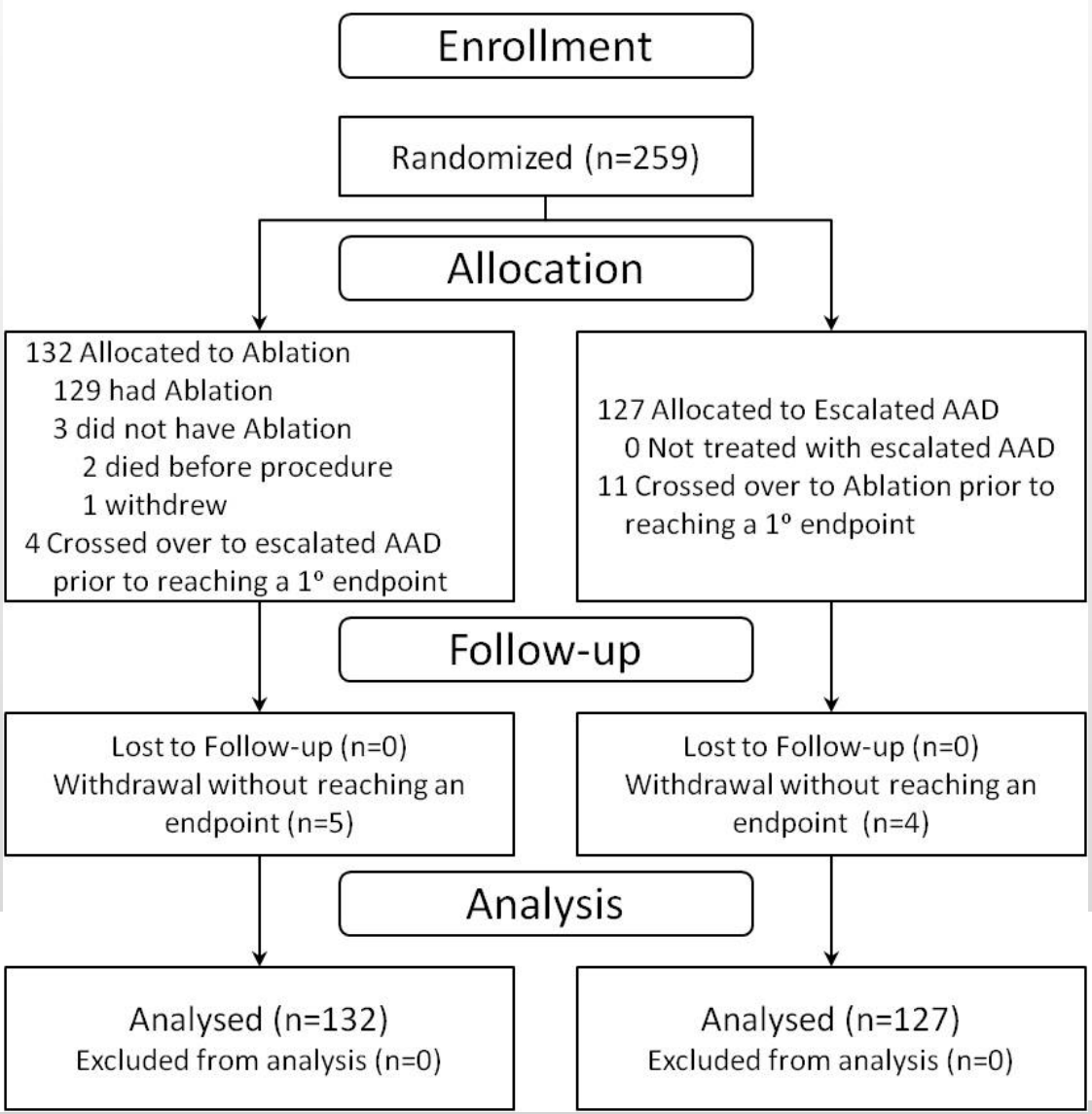
Exclusion

- Unable to consent
- Acute coronary syndrome, MI, or other reversible cause of VT
- Ineligible to take amiodarone or mexiletine
- Ineligible for catheter ablation
- Severe renal failure, functional class IV dyspnea or angina, pregnancy, estimated survival < 1 year
- Prior catheter ablation for VT

Methods

- Standardized ICD Programming and f/u
- Blinded adjudication of endpoints
- Primary Outcome:
  - Death
  - Appropriate ICD shock after 30 days
  - VT Storm after 30 days

VANISH: Results



7 patients had repeat ablation within 30 days. After experiencing a primary outcome, 27 were treated with escalated AAD and 13 had repeat ablation

37 patients treated with catheter ablation after experiencing a primary outcome, 23 had further escalation of AAD therapy

Catheter Ablation Procedural Characteristics

	Catheter Ablation Group†	Antiarrhythmic Drug Group†
Number of Procedures	158	66
Mapping Methods used		
Activation Mapping	59 (37.3)	33 (50.0)
Entrainment Mapping	50 (31.6)	30 (60.0)
Substrate Mapping	140 (88.6)	57 (86.4)
Pace-Mapping	116 (73.4)	52 (78.8)
No Inducible Arrhythmia at Baseline	14	4
RF Time (minutes)	38.7 ± 21.9	36.8 ± 20.6
Number of RF applications	29.4 ± 27.9	38.9 ± 26.7
Fluoroscopy time (minutes)	31.5 ± 20.8	29.4 ± 35.1
Procedure time (minutes)	263 ± 83.5	251 ± 85.0
Reinduction Testing Performed	130 (82.2)	52 (78.8)
Acutely Successful Procedure*	110	33

† Plus-minus values represent mean ± SD; categorical values are n (%). * Acute success was defined to include procedures in which reinduction testing was performed, and no arrhythmia was inducible or only nonclinical VT with CL<300 msec was inducible.

Causes Of Death

Event	AAD Group (n=127) No. (%)	Catheter Ablation Group (n=132) No. (%)	P
Death	35 (27.6)	36 (27.3)	1.0
Non-Cardiac Death	8 (6.3)	12 (9.1)	0.49
Cardiovascular Death	26(20.5)	24(18.2)	0.75
Myocardial Infarction		1 (0.8)	1.0
Congestive Heart Failure	19 (15.0)	17 (12.9)	0.72
Ventricular Arrhythmia	5 (3.9)	3 (2.3)	0.50
Stroke		1 (0.8)	1.0
Other Cardiovascular	1 (0.8)		0.49
ICD-Related Death	2 (1.6)	2 (1.5)	1.0
Unknown Cause of Death	1 (0.8)		0.49

Limitations

- Not powered to assess mortality
- Multicentre trial, operator-dependence
- Potential impact of prolonged detection time

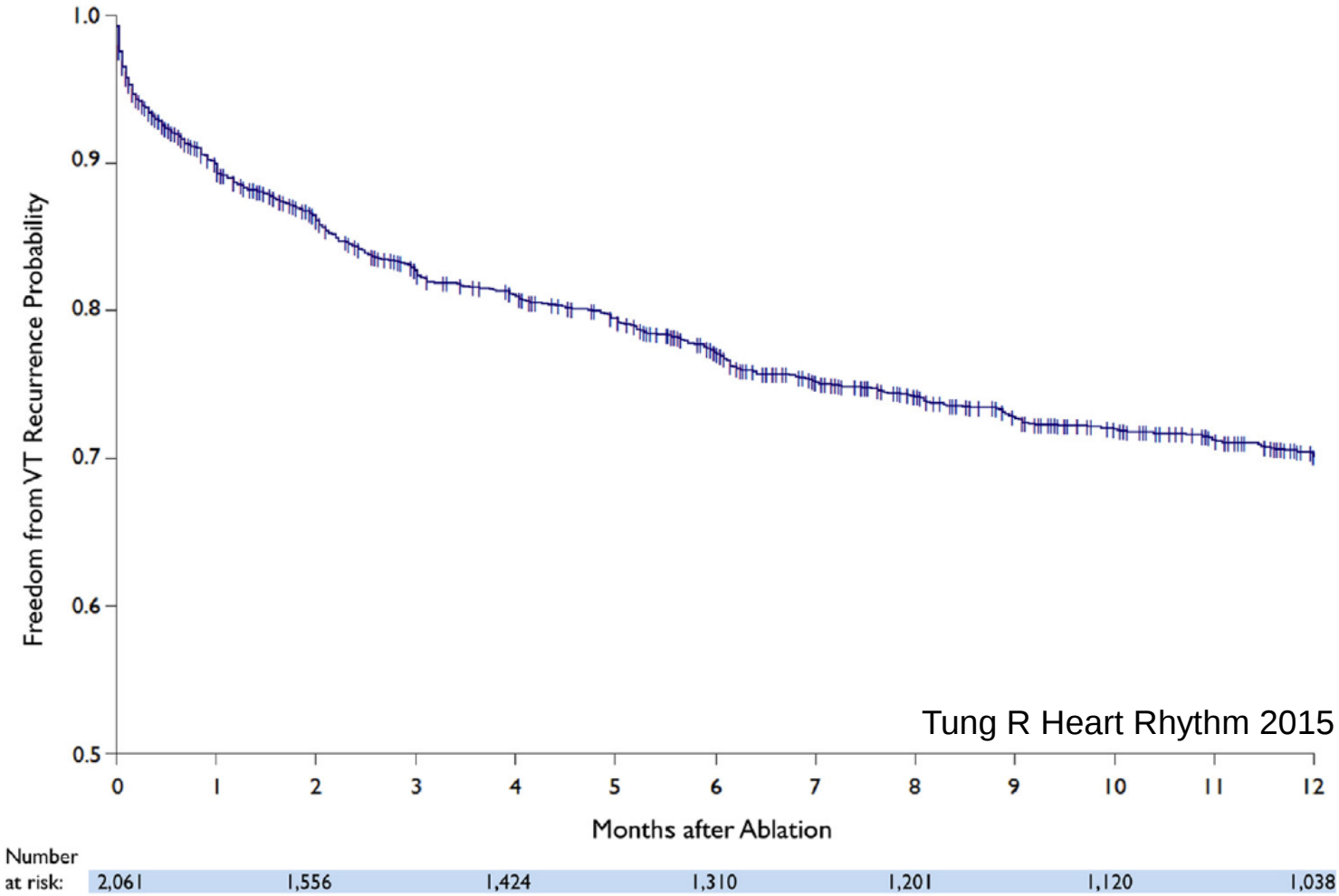
Discussion

- High risk population:
  - ~50% recurrence and ~25% mortality at 3 years
  - Most deaths due to heart failure or non-cardiac causes
- A significant difference in mortality was not observed

Discussion

- Most of the benefit was observed among patients with VT despite amiodarone.
- Adverse events tended to be more frequent among patients treated with escalated antiarrhythmic drug therapy.

International VT Ablation Center Collaborative



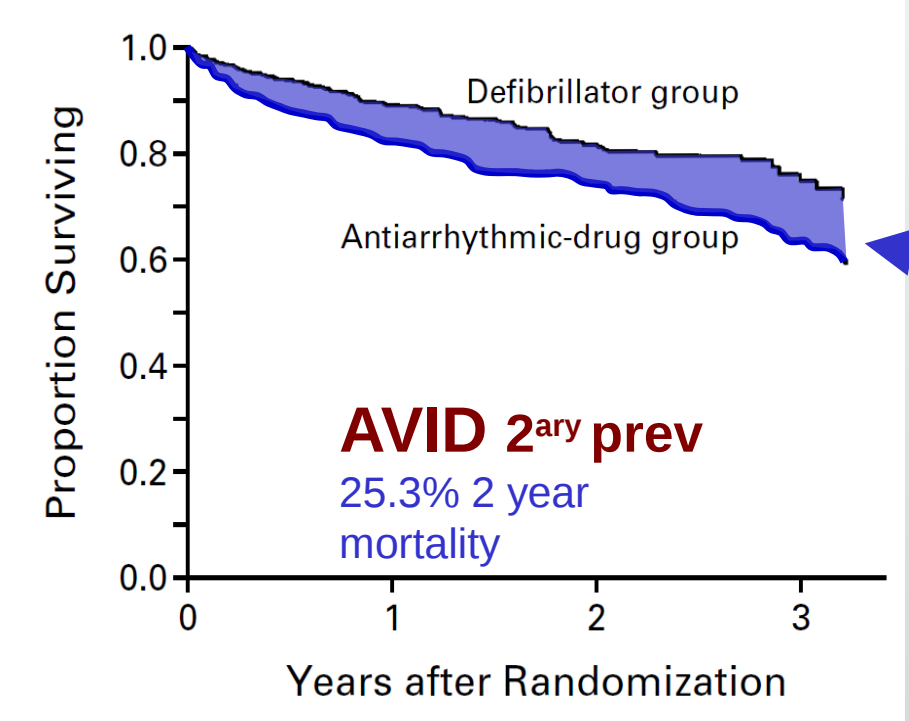
Tung R Heart Rhythm 2015

Figure 1 Kaplan–Meier estimate of freedom from ventricular tachycardia (VT) in the overall cohort.

Effect of ICDs

- ICD: for mortality reduction

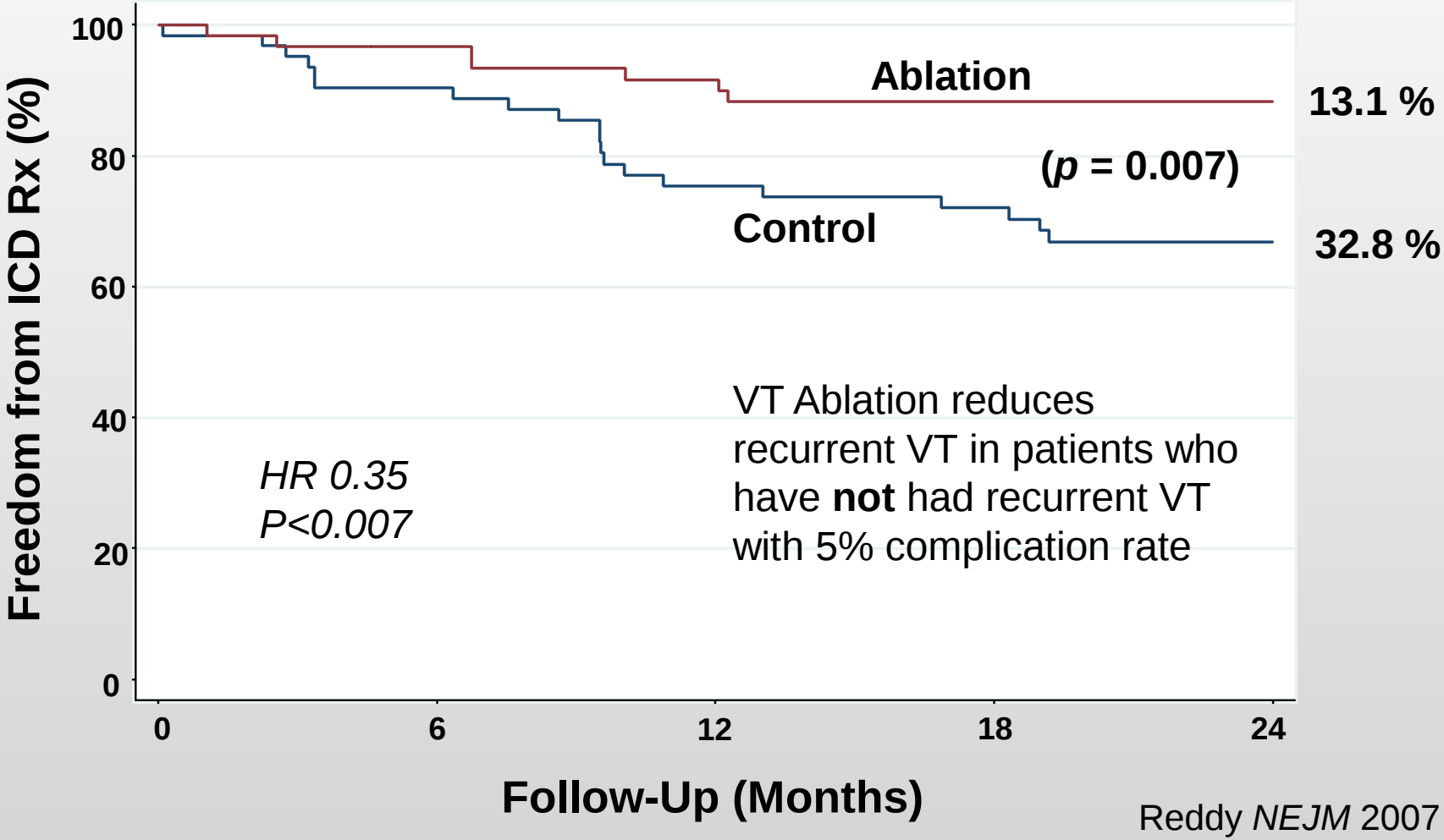
Sudden death transformed to a chronic disease



Risk modifiable with ICD

- Drugs and Ablation for *VT* Reduction

SMASH-VT: ICD Therapy



Reddy *NEJM* 2007

SMASH-VT: ICD Therapy

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 27, 2007 VOL. 357 NO. 26

Prophylactic Catheter Ablation for the Prevention of Defibrillator Therapy

Vivek Y. Reddy, M.D., Matthew R. Reynolds, M.D., Petr Neuzil, M.D., Ph.D., Allison W. Richardson, M.D., Milos Taborsky, M.D., Ph.D., Krit Jongnarangsin, M.D., Stepan Kralovec, Lucie Sediva, M.D., Jeremy N. Ruskin, M.D., and Mark E. Josephson, M.D.

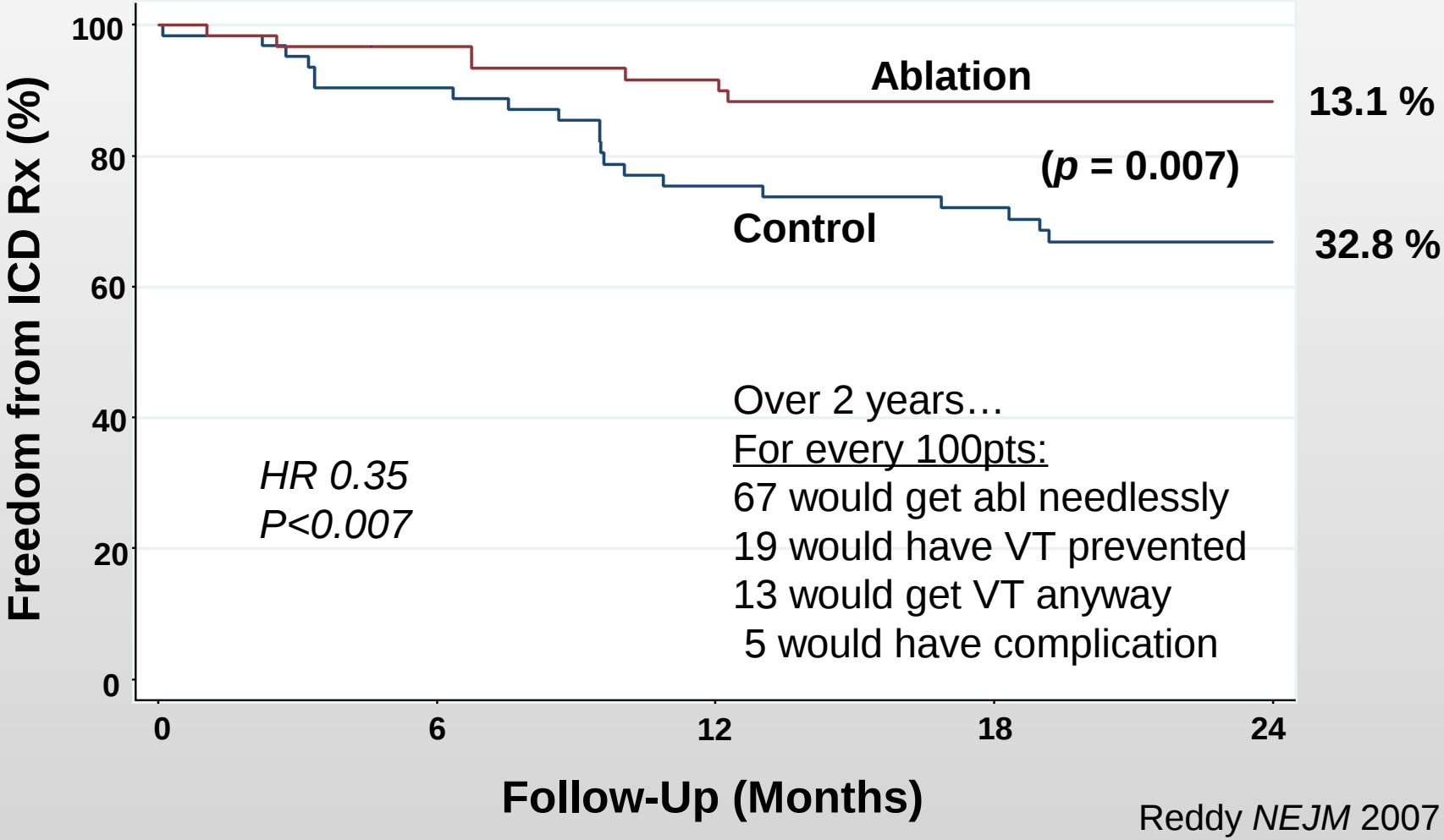
3-Center RCT, 128 patients with VT/VF being implanted with ICD

(also included some pts with therapy from primary prophylactic ICD)

Excluded VT storm and recurrent VT

Randomized to prophylactic VT ablation vs ICD alone

SMASH-VT: ICD Therapy



Reddy *NEJM* 2007

VTACH

Catheter ablation of stable ventricular tachycardia before defibrillator implantation in patients with coronary heart disease (VTACH): a multicentre randomised controlled trial

*Karl-Heinz Kuck, Anselm Schaumann, Lars Eckardt, Stephan Willems, Rodolfo Ventura, Etienne Delacrétaz, Heinz-Friedrich Pitschner, Josef Kautzner, Burghard Schumacher, Peter S Hansen, for the VTACH study group**

Lancet 2010

Summary

Background In patients with ventricular tachycardia (VT) and a history of myocardial infarction, intervention with an implantable cardioverter defibrillator (ICD) can prevent sudden cardiac death and thereby reduce total mortality. However, ICD shocks are painful and do not provide complete protection against sudden cardiac death. We assessed the potential benefit of catheter ablation before implantation of a cardioverter defibrillator.

Lancet 2010; 375: 31–40

See Comment page 4

*Members listed at end of paper

Hanseatisches Herzzentrum, Asklepios Klinik St Georg,

RCT of patients with stable VT (no syncope, BP >90) to receive either ICD *or* ICD and ablation

- 110 pts; 54 randomized to ablation, 8 not ablated (1 excluded, 2 had complications precluding ablation, 5 had technical problems or access issues etc)
- *A group with higher risk of recurrent VT*