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ICD Programmierung bei Kammertachykardie

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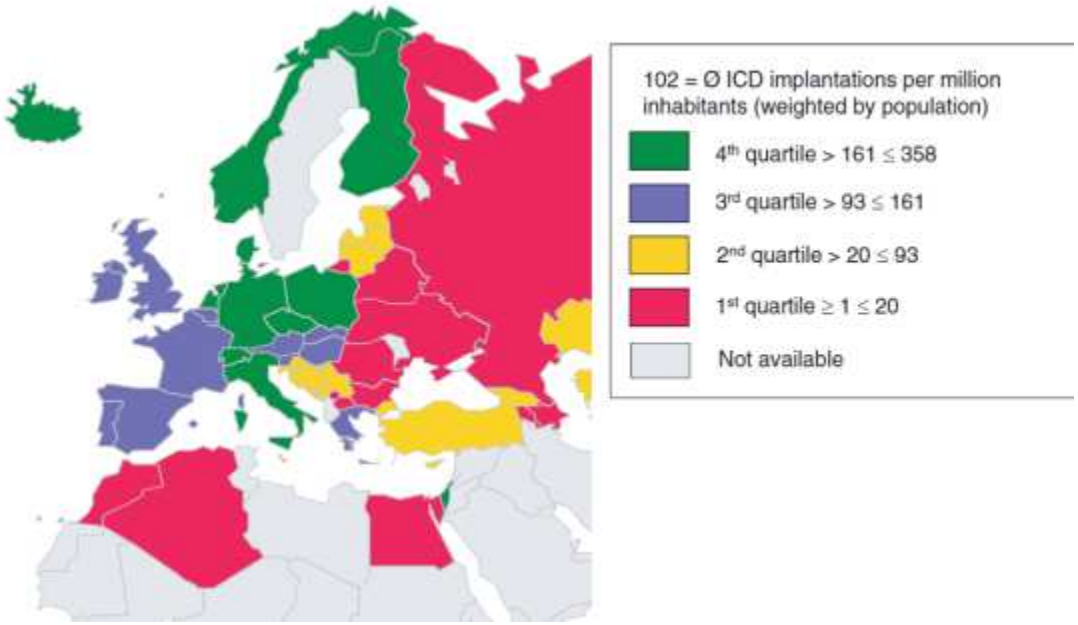
Universitätsspital Basel

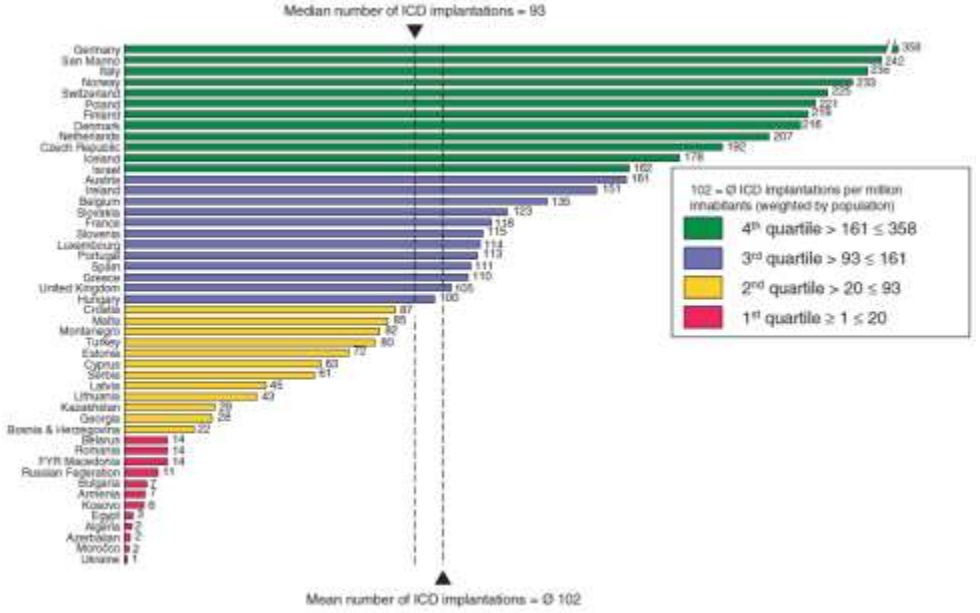
ICD Implantations in Europe 2015

500’000 sudden cardiac deaths
>100’000 implantations annually (costs>2 billion €)



Primär- vs. Sekundärprävention

CH 2015:
1221 ICD Erstimplantationen
(145/mio)



ICD zur Sekundärprävention des PHT

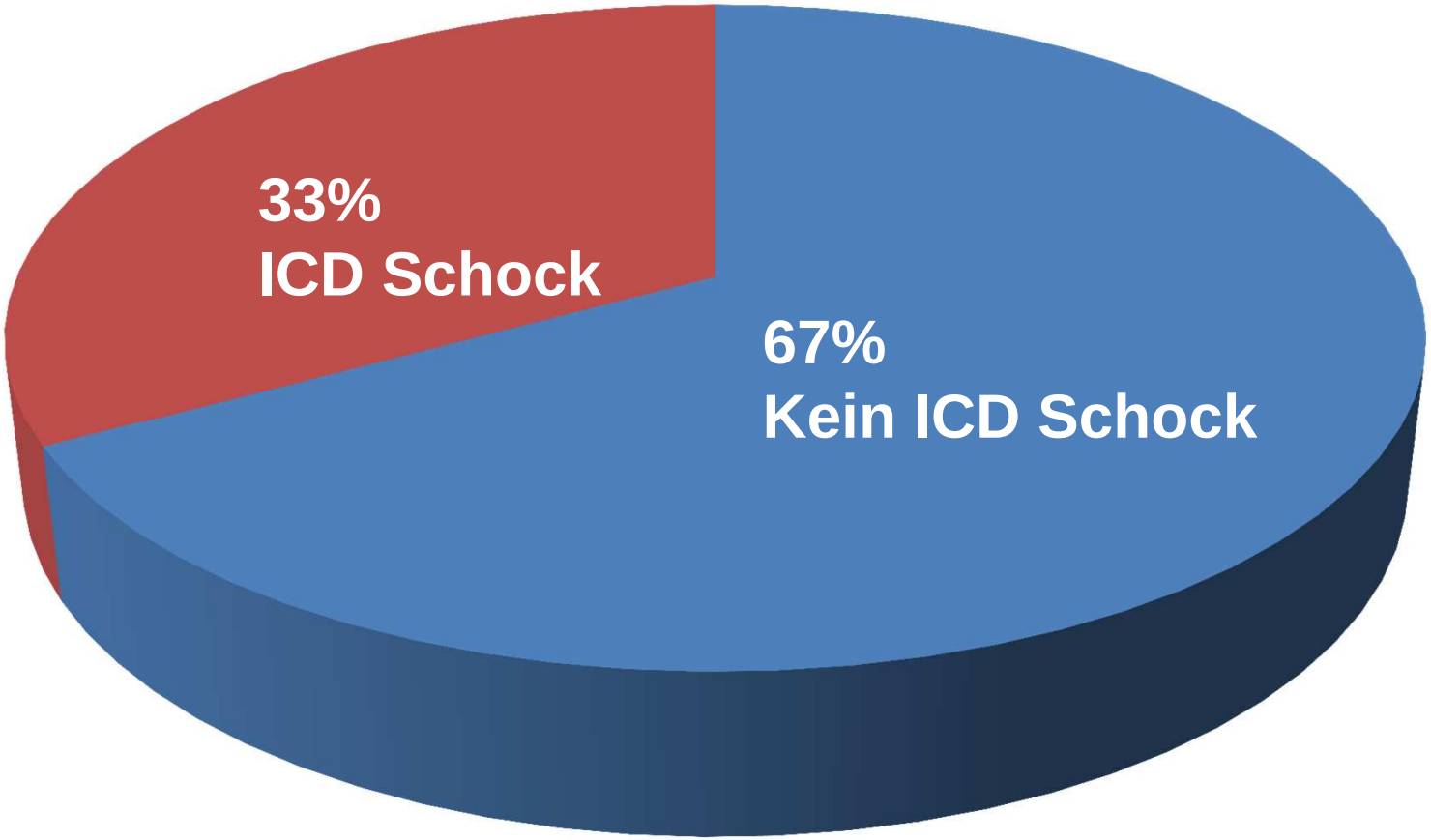
2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

ICD for the secondary prevention of sudden cardiac death and ventricular tachycardia

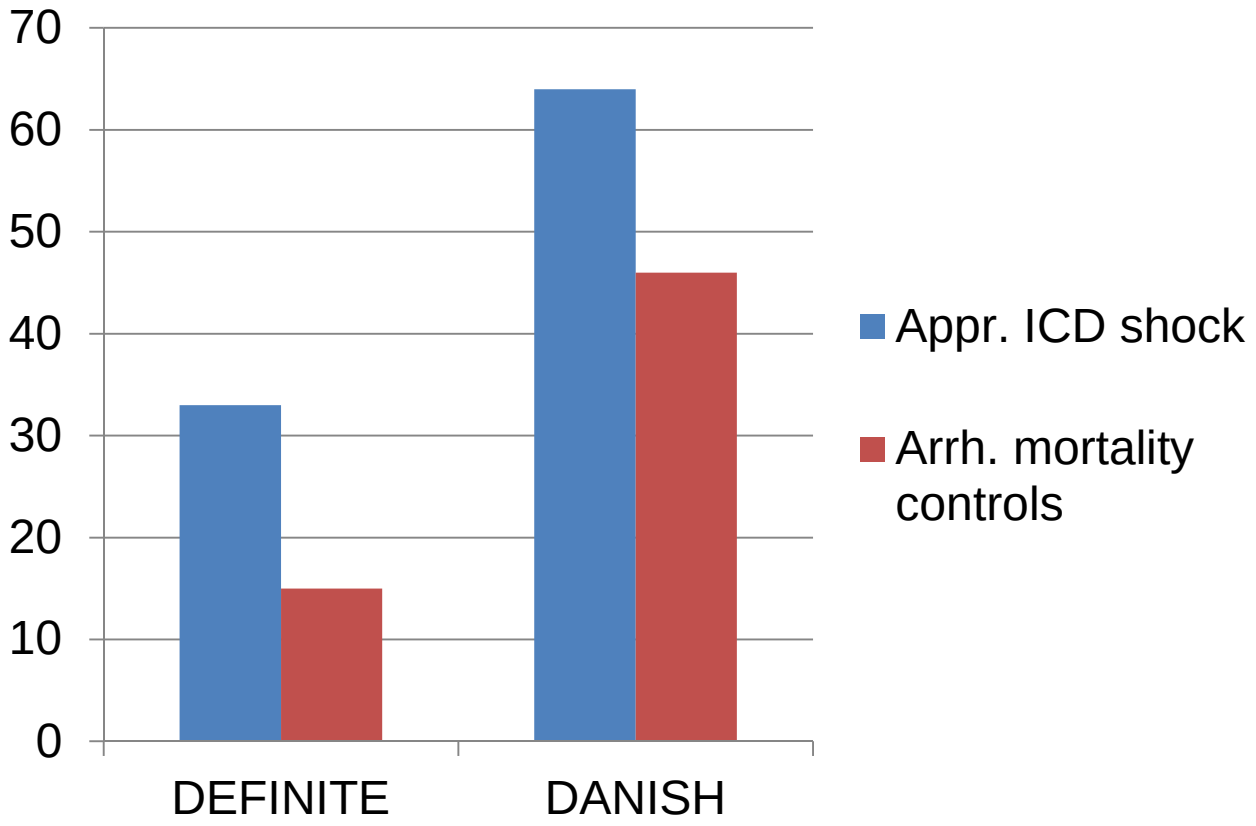
Recommendations	Class[a]	Level[b]	Ref.[c]
ICD implantation is recommended in patients with documented VF or haemodynamically not tolerated VT in the absence of reversible causes or within 48 h after myocardial infarction who are receiving chronic optimal medical therapy and have a reasonable expectation of survival with a good functional status >1 year.	I	A	151–154
ICD implantation should be considered in patients with recurrent sustained VT (not within 48 h after myocardial infarction) who are receiving chronic optimal medical therapy, have a normal LVEF and have a reasonable expectation of survival with good functional status for >1 year.	IIa	C	This panel of experts
In patients with VF/VT and an indication for ICD, amiodarone may be considered when an ICD is not available, contraindicated for concurrent medical reasons or refused by the patient.	IIb	C	155, 156

Priori S et al., Eur Heart J 2015

Wieviel der Pat. mit primärprophylaktischem ICD erhalten einen gerechtfertigten Schock?

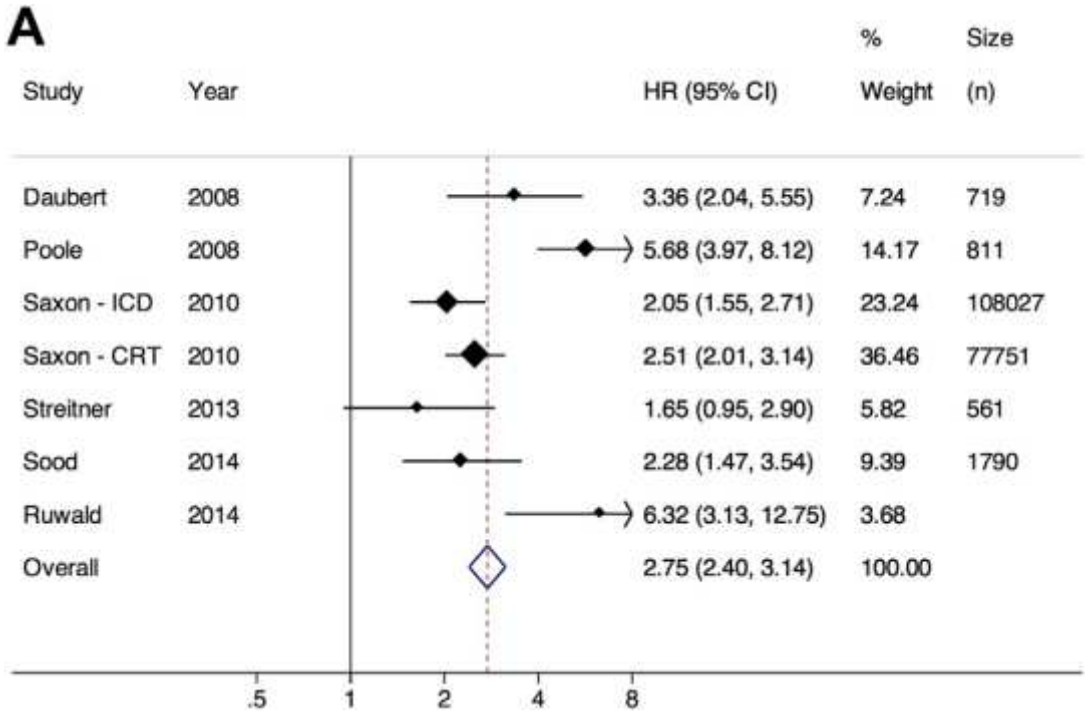


FAKT #2:
Appropriate ICD Therapie ≠ verhinderter plötzlicher Herztod



FAKT #3:
Patienten mit appropriater ICD Therapie haben eine höhere Mortalität !

Systematic review and Metaanalysis



Mortality
HR appr. Shock 2.75

HR inappr. Shock 1.71

Proietti R et al. Can J Cardiol 2015;31:270

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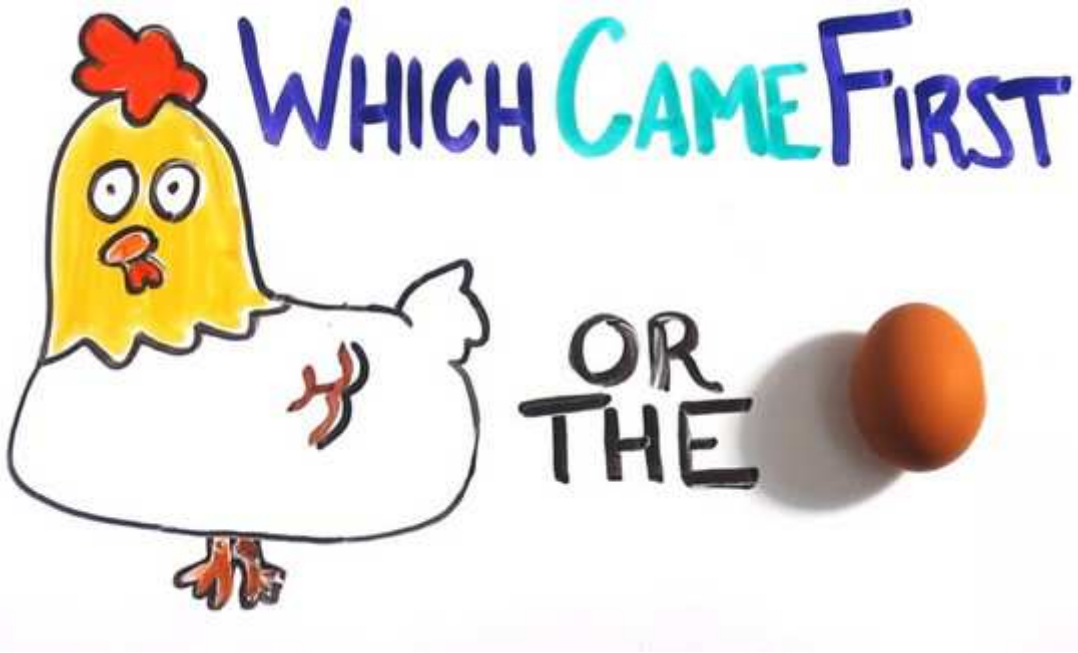
Warum sterben Patienten mit appropriaten ICD Schocks häufiger?

- Schocks per se beschleunigen die zugrundeliegende Erkrankung

OR

- Schocks sind nur eine Marker einer sich verschlechternden CV Erkrankung



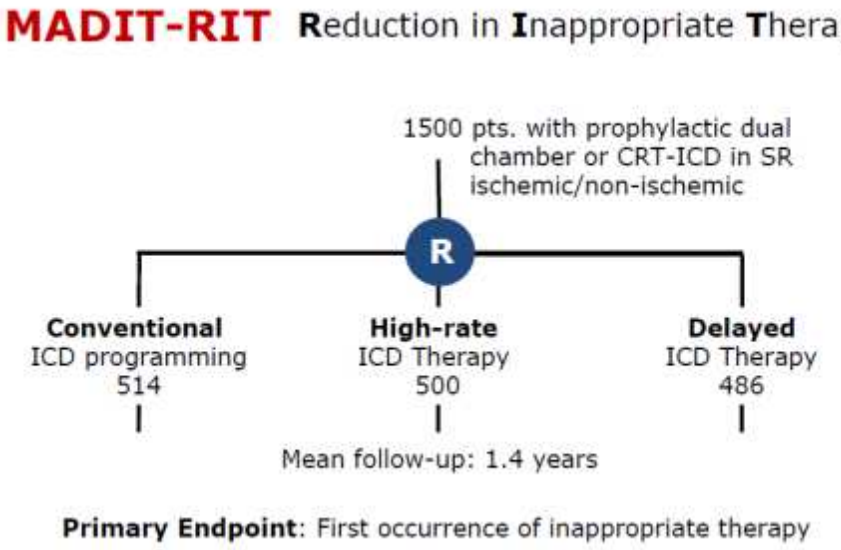
Ziele einer vernünftigen ICD Programmierung

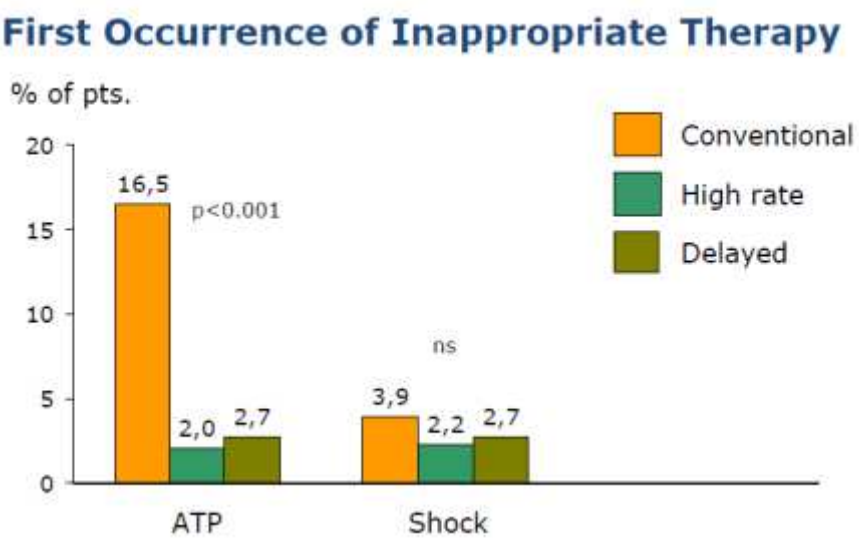
- 1. Verhinderung **ungerechtfertigter** ICD-Therapien
  - Vorhofflimmern, Sinustachykardien, nicht-anhaltende VT, externes «noise», Elektrodenprobleme

- 2. Verhinderung **gerechtfertigter** ICD Schocks
  - für Arrhythmien die nicht zum Tode oder einer klinischen Verschlechterung führen

- 3. Behandlung von Kammerflimmern oder Kammertachykardien die unbehandelt zum Tode führen

Reduction of inappropriate shocks and mortality by better programming

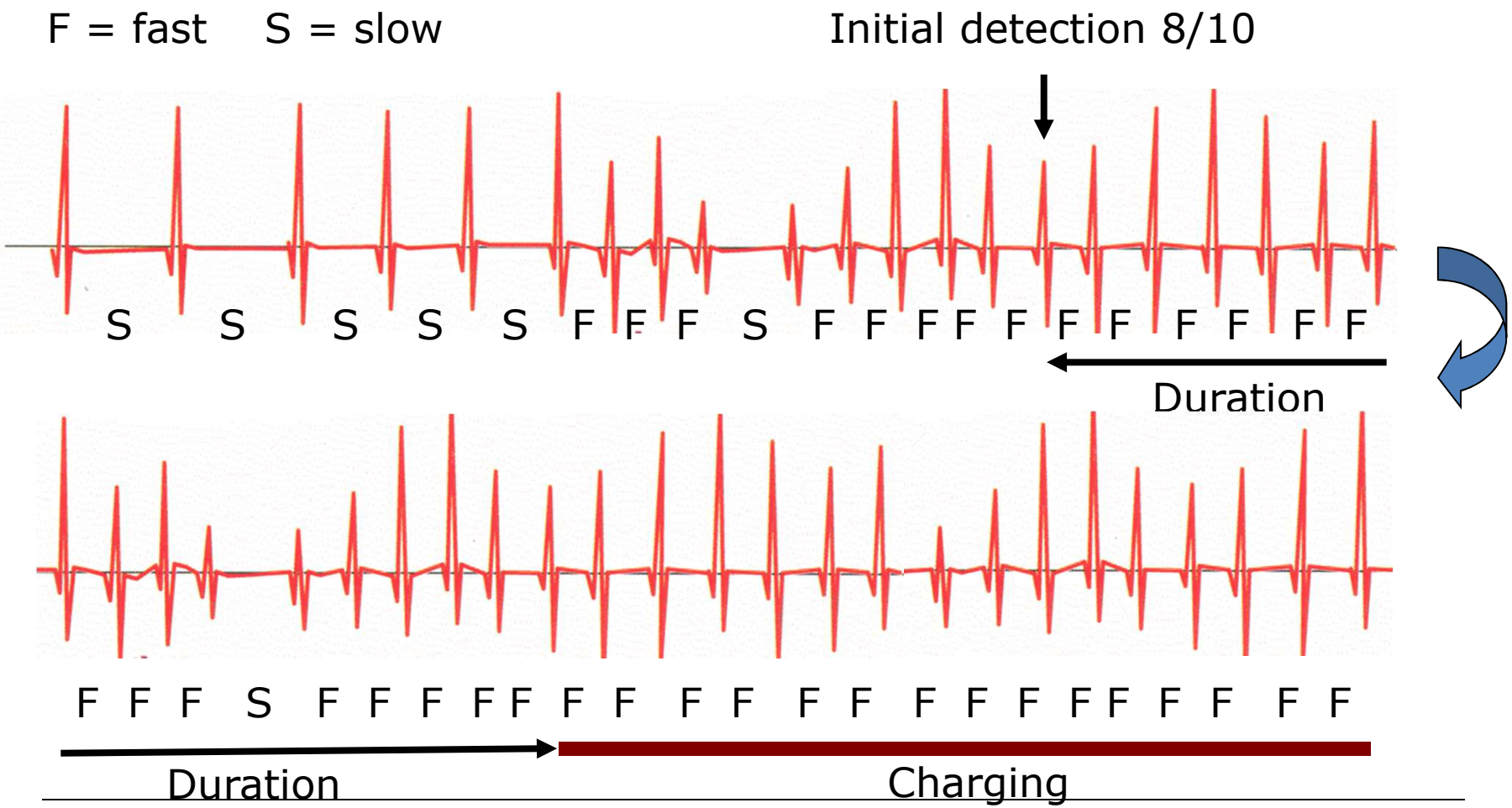




Current rate of inappropriate shocks: 3-5%

Moss AJ et al. N Engl J Med 2012;367:2275
Gasparini et al. JAMA 2013

VF Detection in Boston Scientific ICD



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Conventional ICD programming	**High-rate** ICD Therapy	**Delayed** ICD Therapy
VT zone: ≥170 bpm, 2.5 s ***16 intervals*** Onset, Stability ATPs + shocks	VT zone: monitoring only ≥170 bpm	VT1 zone: ≥170 bpm, 60 s ***180 intervals*** dual chamber det. ATPs + shocks VT2 zone: ≥200 bpm, 12 s ***51 intervals*** dual chamber det. ATPs + Shocks
VF zone: ≥200 bpm, 1 s ***11 intervals*** ATP + shocks	VF zone: ≥200 bpm, 2.5 s ***17 intervals*** ATP + shocks	VF zone: ≥250 bpm, 2.5 s ***19 intervals*** ATP + shocks

Moss A et al. NEJM 2012

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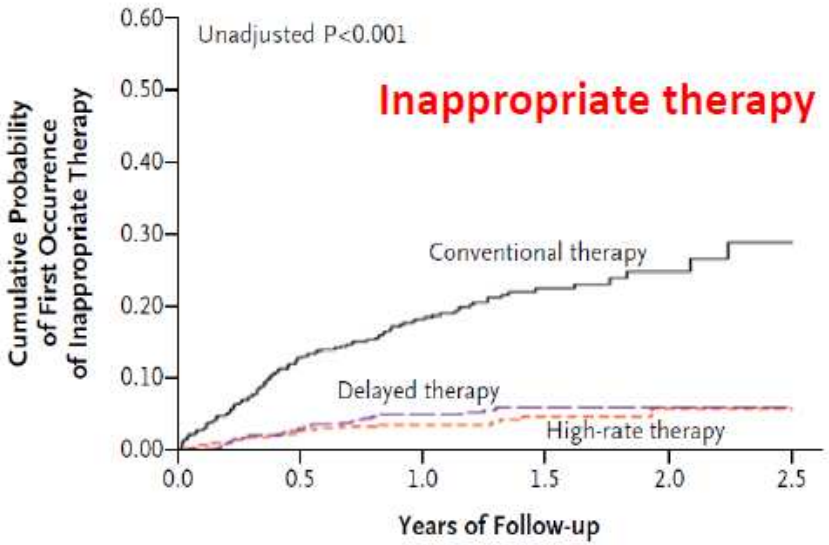
Reduction in Inappropriate Therapy and Mortality through ICD Programming

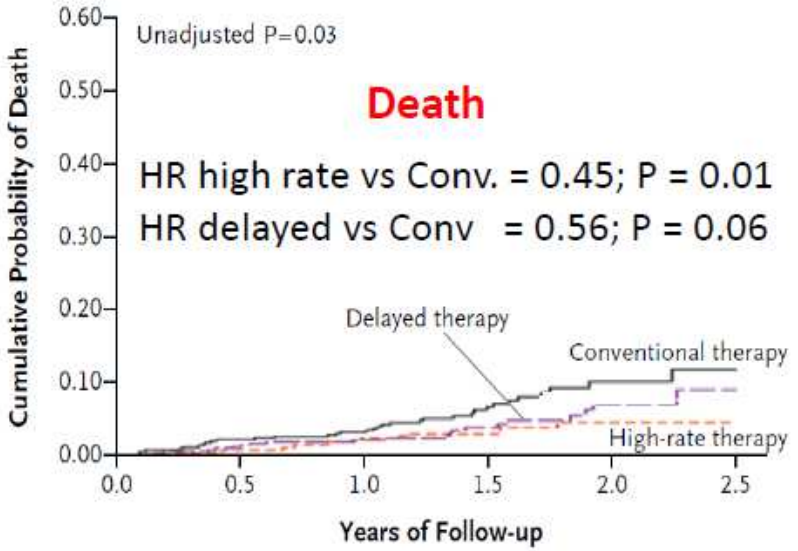
Arthur J. Moss, M.D., Claudio Schuger, M.D., Christopher A. Beck, Ph.D., Mary W. Brown, M.S., David S. Cannom, M.D., James P. Daubert, M.D., N.A. Mark Estes III, M.D., Henry Greenberg, M.D., W. Jackson Hall, Ph.D.,* David T. Huang, M.D., Josef Kautzner, M.D., Ph.D., Helmut Klein, M.D., Scott McNitt, M.S., Brian Olshansky, M.D., Morio Shoda, M.D., David Wilber, M.D., and Wojciech Zareba, M.D., Ph.D., for the MADIT-RIT Trial Investigators†

N Engl J Med 2012;367:2275-83

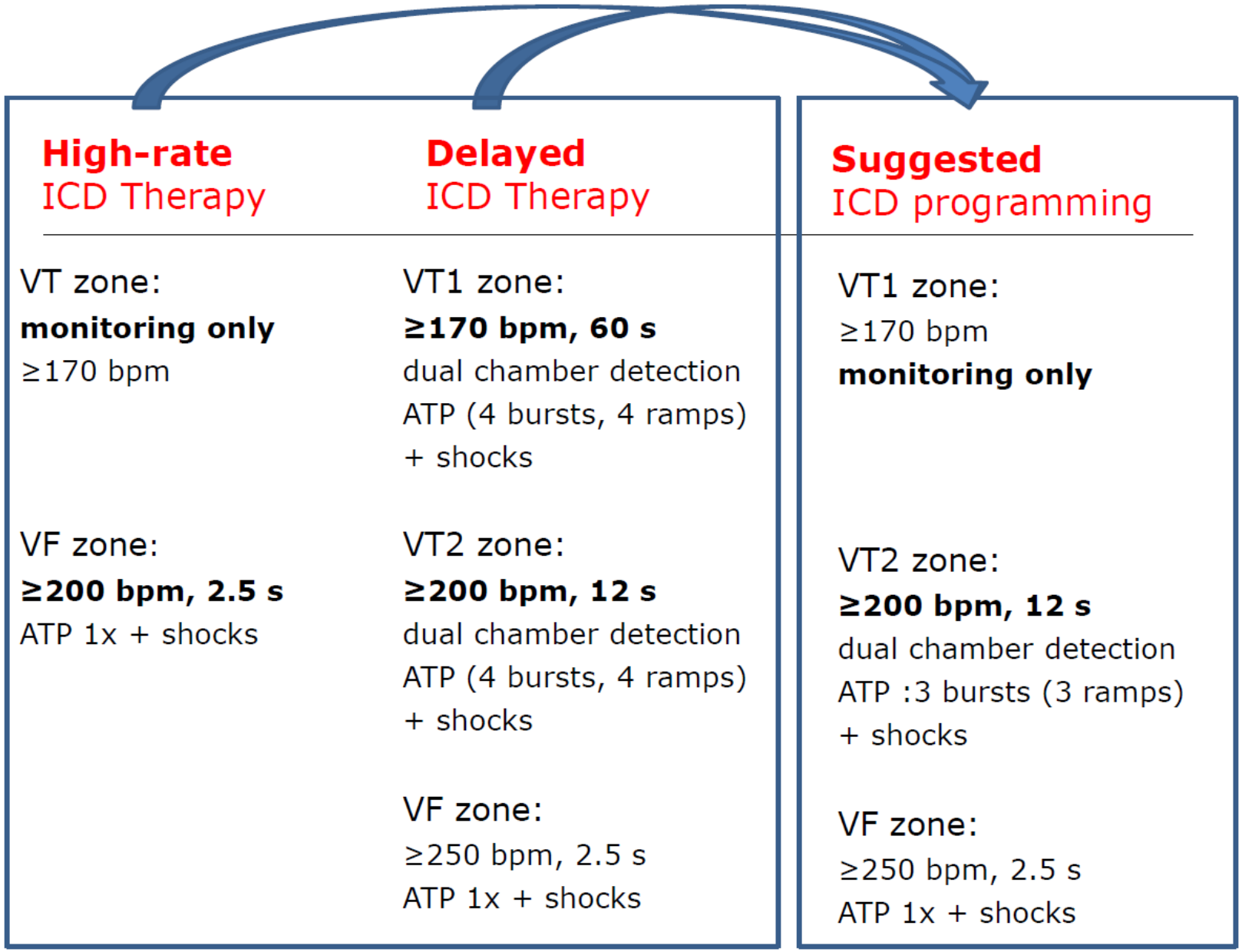
1500 *primary prevention* ICD pts randomized to conventional vs. high rate vs delay.
Primary endpoint: first occurrence of inappropriate therapy



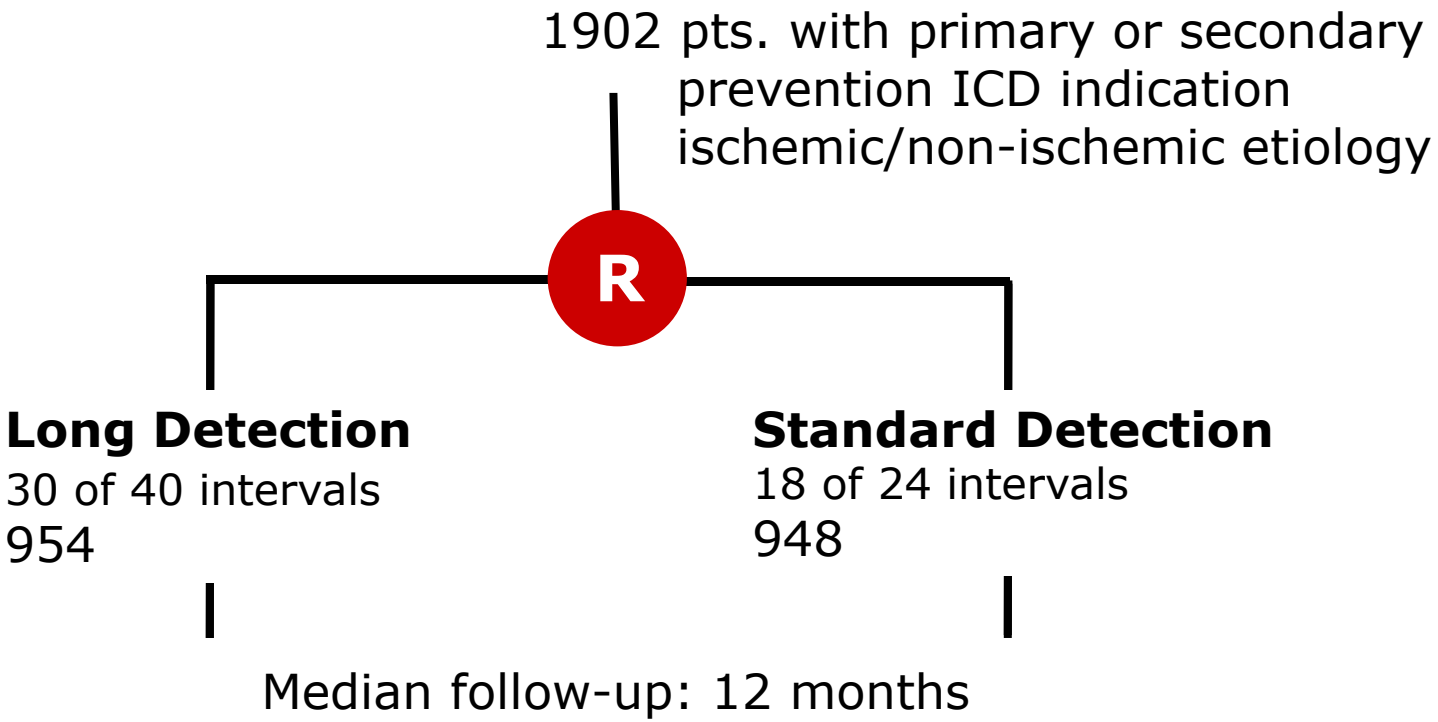
No. at Risk						
Conventional therapy	514	420 (0.13)	305 (0.18)	149 (0.22)	56 (0.25)	8 (0.29)
High-rate therapy	500	454 (0.03)	339 (0.04)	191 (0.05)	70 (0.06)	17 (0.06)
Delayed therapy	486	445 (0.03)	342 (0.05)	177 (0.06)	82 (0.06)	13 (0.06)



No. at Risk						
Conventional therapy	514	490 (0.02)	392 (0.03)	219 (0.07)	89 (0.10)	14 (0.12)
High-rate therapy	500	478 (0.01)	372 (0.02)	221 (0.03)	90 (0.05)	21 (0.05)
Delayed therapy	486	471 (0.01)	375 (0.02)	205 (0.04)	99 (0.07)	14 (0.09)


High-rate
ICD Therapy
VT zone:
monitoring only
≥170 bpm
VF zone:
≥200 bpm, 2.5 s
ATP 1x + shocks
Delayed
ICD Therapy
VT1 zone:
≥170 bpm, 60 s
dual chamber detection
ATP (4 bursts, 4 ramps)
+ shocks
VT2 zone:
≥200 bpm, 12 s
dual chamber detection
ATP (4 bursts, 4 ramps)
+ shocks
VF zone:
≥250 bpm, 2.5 s
ATP 1x + shocks
Suggested
ICD programming
VT1 zone:
≥170 bpm
monitoring only
VT2 zone:
≥200 bpm, 12 s
dual chamber detection
ATP :3 bursts (3 ramps)
+ shocks
VF zone:
≥250 bpm, 2.5 s
ATP 1x + shocks

ADVANCE III Long vs Standard ICD Detection



Primary Endpoint: Number of all ATPs and shocks delivered for all episodes

Gasparini M et al. JAMA 2013

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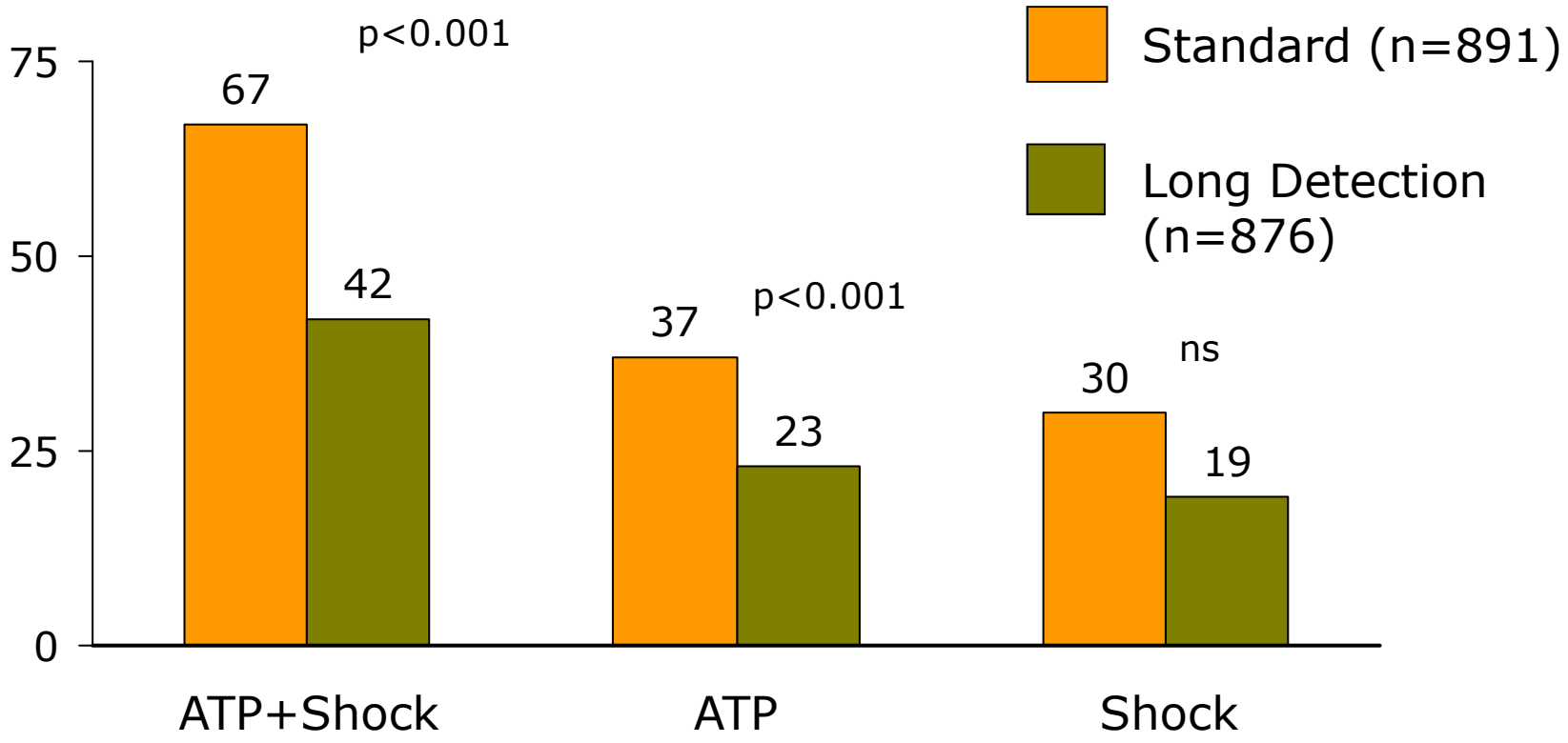
ADVANCE III

Therapy Rate per 100 Patient-years



Gasparini M et al. JAMA 2013

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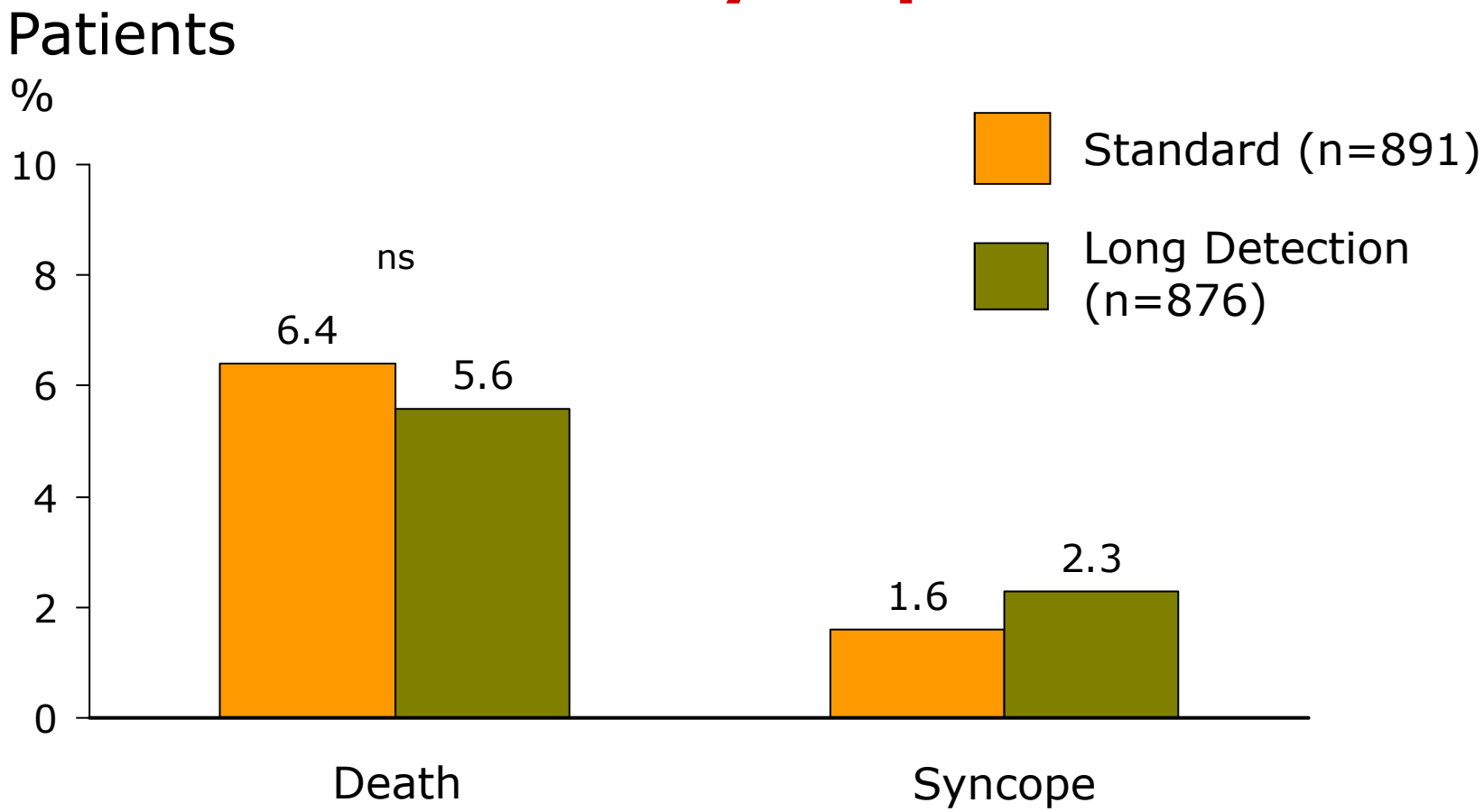
ADVANCE III

Death or Syncope



Gasparini M et al. JAMA 2013

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2015 HRS/EHRA/APHRS/SOLAECE expert consensus statement on optimal implantable cardioverter-defibrillator programming and testing

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2015 HRS/EHRA/APHRS/SOLAECE expert consensus

For secondary prevention ICD patients, tachyarrhythmia detection duration criteria should be programmed to require the tachycardia to continue for at least 6–12 seconds* or for 30 intervals before completing detection, to reduce total therapies. **Tachyarrhythmia detection duration is directly related to the tachyarrhythmia rate. Direct evidence to support a delay > 2.5 seconds for rates over 250 bpm is not available, but can be inferred from evidence that 30 detection intervals are safe at that rate.*	I
Discrimination algorithms to distinguish SVT from VT should be programmed to include rhythms with rates faster than 200 bpm and potentially up to 230 bpm (unless contraindicated*) to reduce inappropriate therapies. **Discrimination algorithms and/or their individual components are contraindicated in patients with complete heart block or if the algorithm/component is known to be unreliable in an individual patient. Dual-chamber discriminators that misclassify VT as SVT if the atrial lead dislodges are discouraged in the perioperative period. Dual-chamber discriminators are contraindicated in patients with known atrial lead dislodgment, atrial undersensing or oversensing of far field R waves, and in those with permanent AF.*	I

2015 HRS/EHRA/APHRS/SOLAECE expert consensus

It is recommended to activate lead-failure alerts to detect potential lead problems.	I
For secondary prevention ICD patients for whom the clinical VT rate is known, it is reasonable to program the slowest tachycardia therapy zone at least 10 bpm below the documented tachycardia rate but not faster than 200bpm*, to reduce total therapies.	IIa

**Higher minimum rates for detection might be appropriate for young patients or for those in whom SVT-VT discriminators cannot reliably distinguish SVT from VT, provided there is no clinical VT below this rate.*

Was heisst das genau ?

- **Primärprophylaxe:**

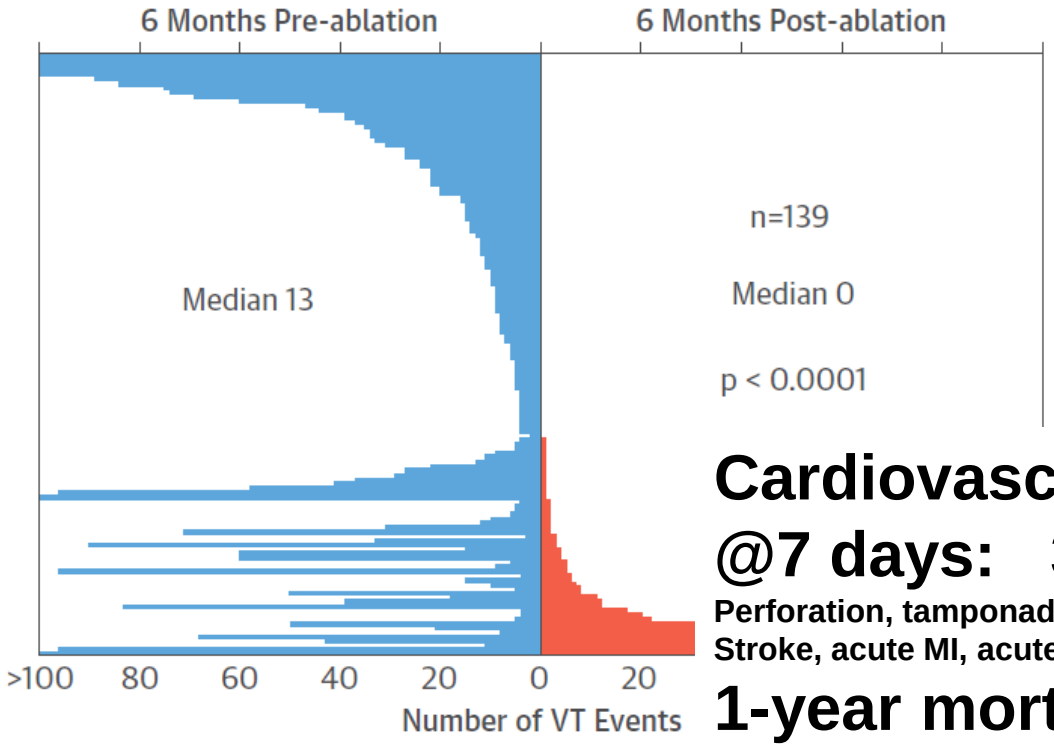
- Lange Detektionszeiten
- höhere rate cut-offs, evtl. nur «Ein-Zonen»(VF) Programmierung

- **Sekundärprophylaxe:**

- Lange Detektionszeiten
- Zahlreiche ATP-Versuche, evtl. ATP Zone only
- Bei rezidivierenden Kammertachykardien frühzeitig an Ablation in erfahrenem Zentrum denken

Post-Approval THERMOCOOL VT Trial
249 patients

FIGURE 3 Frequency of VT During the 6 Months Before and After Ablation for ICD Patients Who Survived for 6 Months



Cardiovascular adverse events

@7 days: 3.3%

Perforation, tamponade, pulmonary embolus, complete heart block
Stroke, acute MI, acute MR or AR, arterial dissection, death

1-year mortality: 13%

Marchlinski FE et al. J Am Coll Cardiol 2016;67:674

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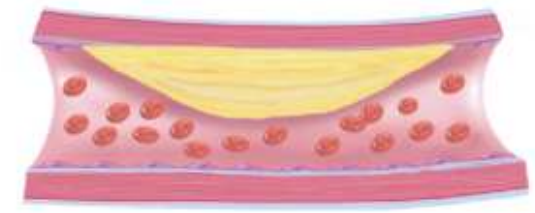
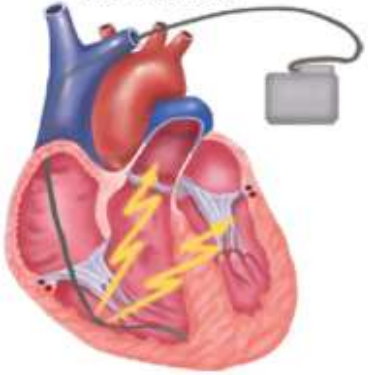
Post-Approval THERMOCOOL VT Trial



Coronary Artery Disease

+ Recurrent VT

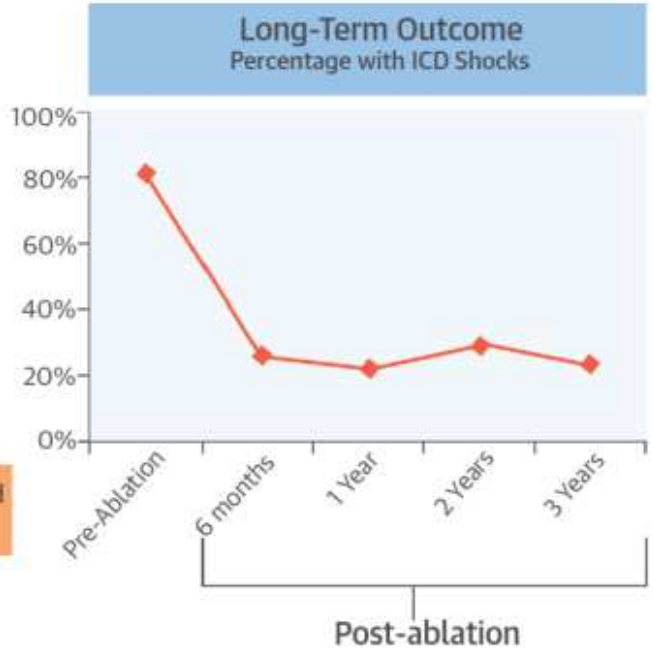
ICD Shocks



Open-Irrigated VT Catheter Ablation

(249 Patients)

No Procedure-Related Strokes



↓Anxiety Score (6 Months)
↓Amiodarone Requirement (6 Months-3 Years)
↓Hospitalizations (6 Months-3 Years)

Marchlinski, F.E. et al. J Am Coll Cardiol. 2016; 67(6):674-83.

USB-Definition von Standard Programmierungen für jeden Hersteller

Tachy:

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Primärprävention (prophylaktische ICD- Implantation):

VT: 185bpm, Detektion fix 8/10, dann 12 sec

Therapie:
1. ATP: 3x Burst, S1 Anzahl: 8, Minimum Intervall 220ms, 84% Zykluslänge
2. ATP: 3x Rampe, S1 Anzahl : 8, Minimum Intervall 220ms, 84% Zykluslänge
1.Schock: 21J, 2. Schock: 41J, 3.- 6. Schock: 41J

VF: 240bpm, Detektion fix 8/10 dann 5 sec

Sekundärprävention (ICD Implantation nach Erreigniss):

VT: muss komplett (Frequenz, Detektion, Therapie) mit Implanteur abgesprochen werden

VF: 240bpm, Detektion fix 8/10 dann 5 sec

Zusammenfassung

Moderne ICD Programmierung:

- möchte den plötzlichen Herztod verhindern
- inappropriate Therapien verhindern
- Unnötige appropriate Therapien verhindern

- **Immer:** lange Detektionszeiten
- **Primärprophylaxe:** hohe Interventionsfrequenzen
- **Sekundärprophylaxe:**
  - Viele ATP, evtl. in VT-Zone ohne Schocks
  - Frühzeitig VT-Ablation in erfahrenem Zentrum erwägen

Weniger ist mehr.

[Ausnahmen bestätigen die Regel]