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ISRAEL HEART SOCIETY

Role of Defibrillation Threshold Testing During ICD implantation- Data from the Israeli ICD registry

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On behalf of the Israeli working group of pacing and electrophysiology of the Israel Heart Society

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Introduction

- Determination of the Defibrillation threshold (DFT) is still widely considered as a routine component of ICD implantation.
- Accumulating evidence questions the clinical significance and safety of this procedure
- Supporting arguments in favor of performing DFT test include: assuring appropriate detection of VT/VF, lead reliability, and system integrity to maximize patient's safety.

Introduction 2

- DFT testing may not reproduce the natural conditions of ventricular arrhythmias (CHF exacerbation, ischemia, electrolyte imbalance) and therefore may not constitute a good predictor of outcome.
- Low DFT does not guarantee a successful defibrillation in the case of a spontaneous ventricular fibrillation
- High DFT is not always accompanied by a worse prognosis.
- DFT testing is not free of complications
- long-term survival and efficacy of ICD treatment may not necessarily be affected by DFT testing

Aim

To evaluate the association between ICD testing and long-term outcome in a large cohort of unselected consecutive patients from the Israeli ICD Registry

Methods

- Patients that received their first ICD/CRT-D between July 2010 and July 2012
- During that period 3598 patients were implanted with an ICD or CRTD.
- The patients were divided into two groups:
  - Patients who underwent DFT testing.
  - Those who did not.

- **Primary endpoints:**
  All-cause mortality and Ventricular arrhythmias treated by the ICD device.

- **Secondary endpoints:**
  combination of VT/VF and death, and inappropriate ICD discharges.

Results

Patients

- 3598 registered patients. 614 underwent DFT testing at the time of implantation, 2982 did not.
- We have complete follow-up data > 3 months for 1485 patients.
- Mean follow-up period was one year (90 days - two years).
- Implantation technique and the decision whether or not to perform DFT testing depended on individual operator's preference in each center

Baseline Characteristics

	DFT group n = 338	No DFT Group n = 1146	P Value
Age at procedure	62.8±12.7	64.9±12.2	**0.007**
Age > 75 (%)	60 (17.8)	264 (23)	**0.03**
Male (%)	293 (87)	940 (82)	**0.04**
Hemoglobin (g/dL)	13 ± 2.2	12.8 ± 2.1	**0.22**
Creatinine (ng/mL)	1.3 ± 1.4	1.36 ± 1.43	**0.45**
GFR < 60 ml/min (%)	102 (30)	407 (35)	**0.07**
Underlying conditions			
Dyslipidemia (%)	177 (53)	611 (54)	**0.75**
Diabetes (%)	114 (34)	441 (39)	**0.1**
Hypertension (%)	191 (57)	679 (60)	**0.34**
ESRD or dialysis (%)	8 (2)	24 (2)	**0.74**
Prior CVA (%)	27 (8)	113 (10)	**0.31**
Smokers (%)	110 (34)	374 (33)	**0.79**

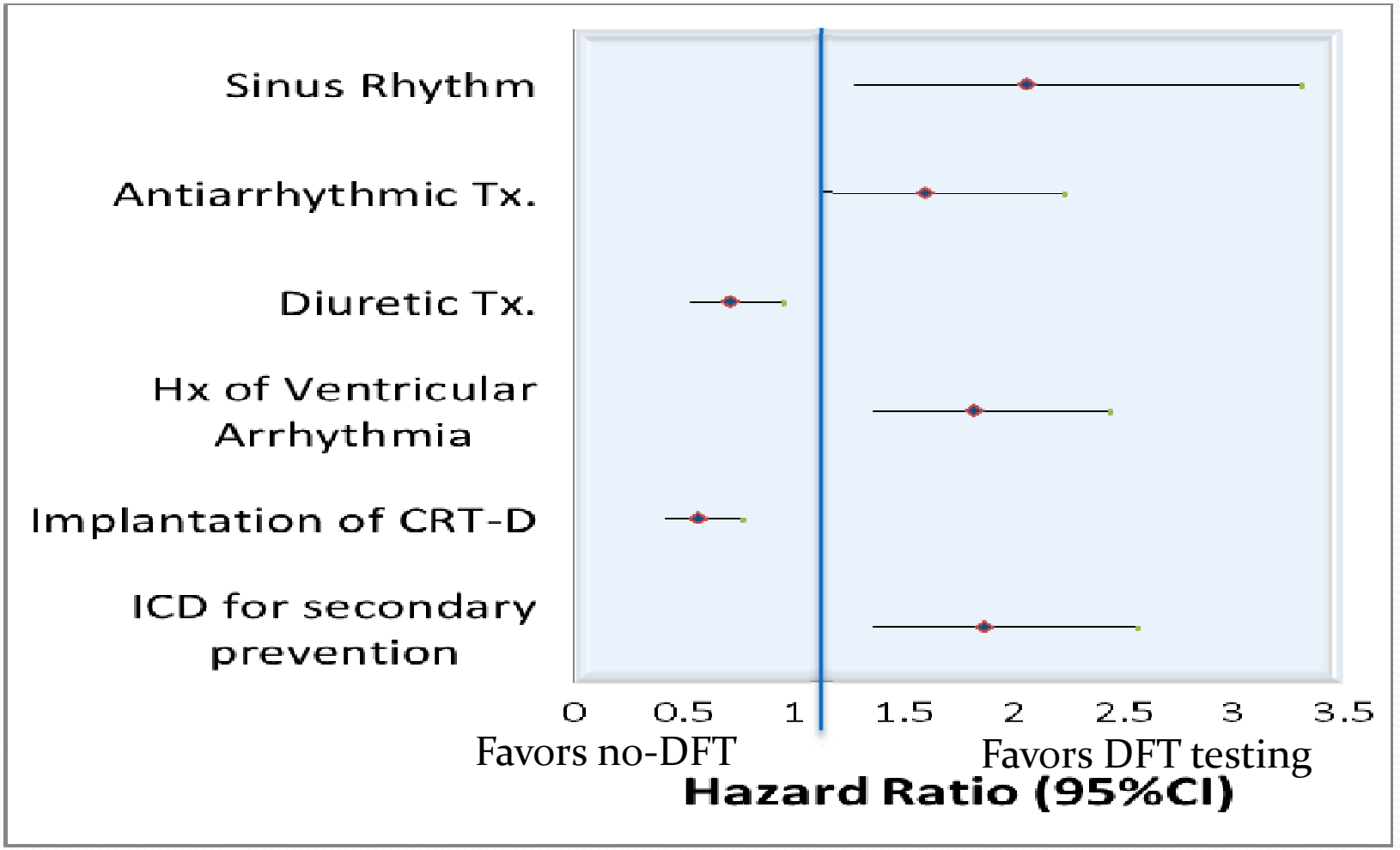
Baseline Characteristics (2)

	DFT group n = 338	No DFT Group n = 1146	P Value
AF (%)	65 (19)	241 (21)	**0.48**
CHF (%)	240 (71)	907 (79.3)	**0.002**
Permanent pacemaker (%)	18 (5)	71 (6)	**0.55**
Ischemic heart disease (%)	250 (74)	852 (74.5)	**0.85**
Prior CABG (%)	116 (47)	361 (42)	**0.24**
Recent MI < 40 days (%)	25 (7)	55 (5)	**0.09**
Medications:			
BB (%)	281 (84)	919 (81)	**0.24**
Anti-arrhythmic Medications (%)	89 (26)	167 (15)	**<0.001**
ACE-I	245 (73)	834 (73)	**0.86**
Diuretics	202 (60)	828 (73)	**<0.001**

	DFT group n = 338	No DFT Group n = 1146	P Value
LV Function:			**<0.001**
Good LV function (EF>50%)	29 (9)	69 (6)	
Mild to moderate LV dysfunction (EF 30-49%)	164 (49)	381 (35)	
Severe LV dysfunction (EF < 30%)	141 (42)	651 (59)	
NYHA functional class III-IV	76 (22)	448 (39)	**<0.001**
ECG characteristics: (from 618 ECG's documented)			
LBBB (%)	63 (59)	389 (76)	**0.002**
RBBB (%)	28 (26)	66 (13)	**0.002**
QRS duration (mSec)	112.7 ± 28	122.2 ± 32	**<0.001**
QRS > 120 mSec (%)	96 (28)	484 (42)	**<0.001**

	DFT group (n =338)	No DFT Group (n =1146)	P Value
Indication for procedure			
Non-Ischemic CM (%)	64 (19)	257 (22)	**0.17**
Hypertrophic CM (%)	20 (6)	73 (6)	**0.77**
Arrythmogenic RV CM	2	5	**0.71**
Long QT syndrome	4	3	
Brugada syndrome	1	5	
Prior ventricular arrhythmia (%)	190 (56.4)	374 (32.7)	**<0.001**
Secondary Prevention (%)	152 (45)	245 (21)	**<0.001**
Procedure type:			
CRTD (%)	82 (24)	491 (43)	**<0.001**
ICD (%)	460 (78.5)	1355 (56.8)	**<0.001**
Upgrade (Pacemaker to ICD/CRTD or CRTP to CRTD) (%)	17 (5)	59 (5)	0.93

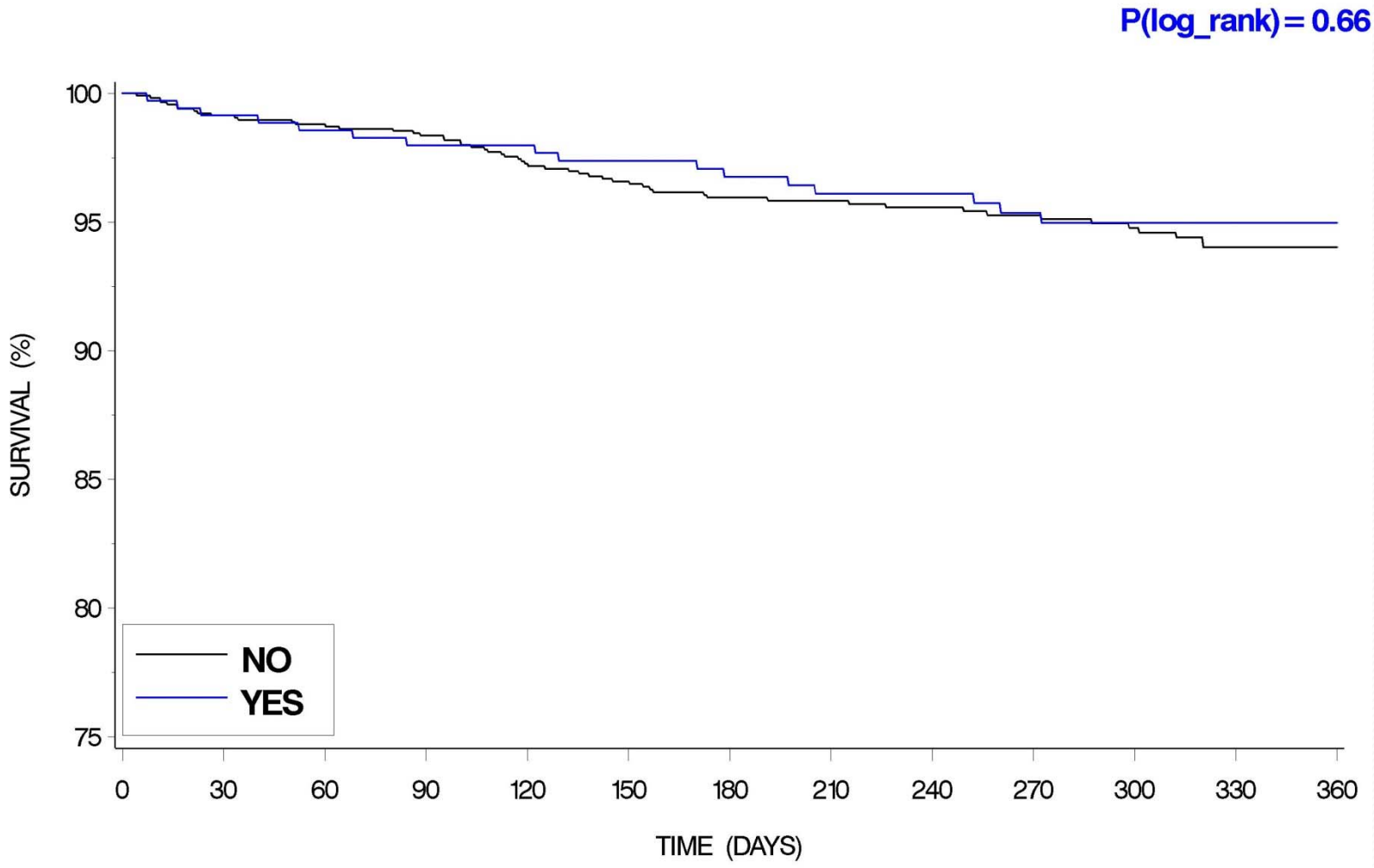
FACTORS ASSOCIATED WITH DFT TESTING



Outcome

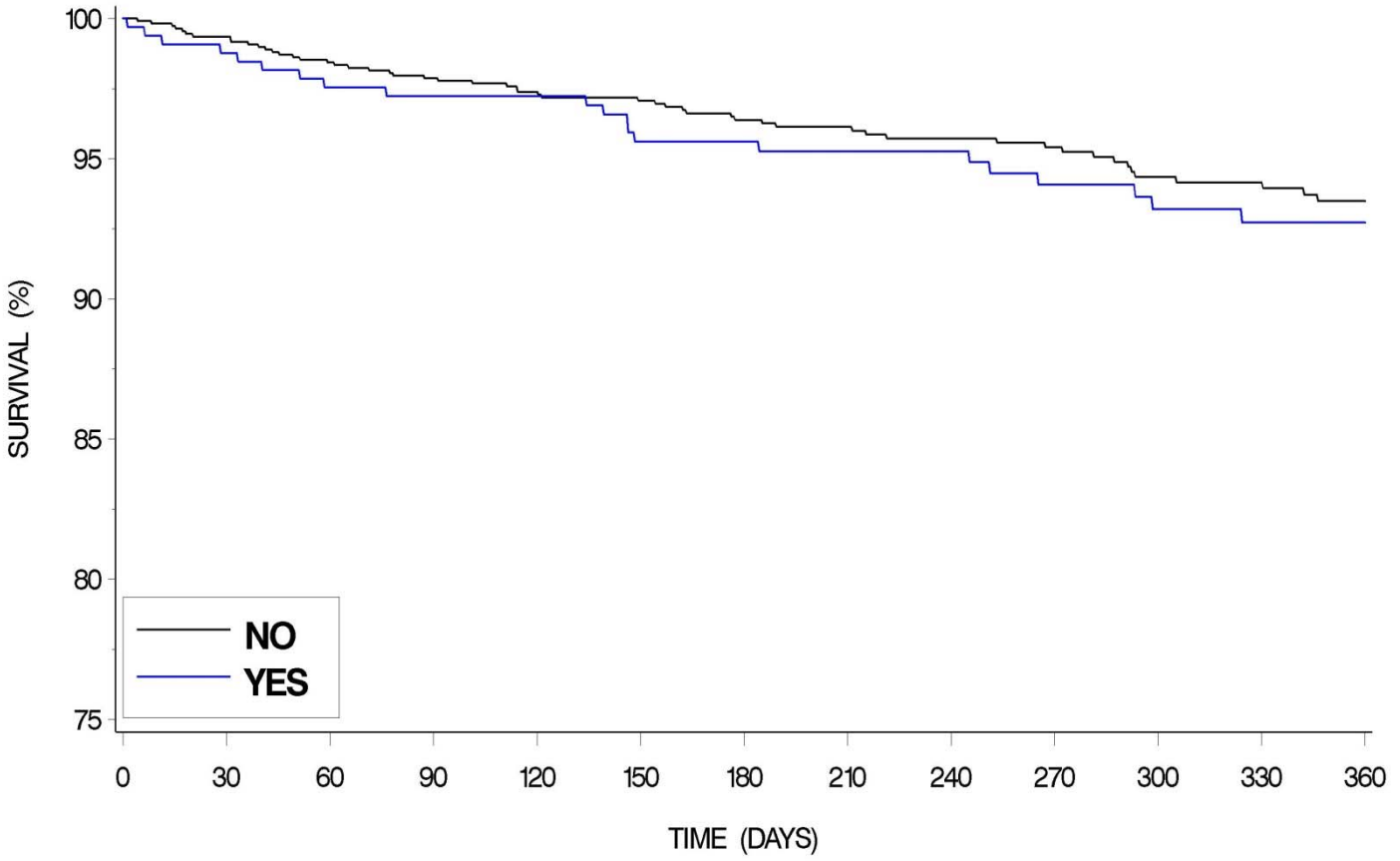
	DFT Group n =337	No DFT Group n =1141	P value
Primary Endpoints:			
Death	19 (5.6%)	59 (5.2%)	0.74
1st appropriate therapy (ATP or shock)	29 (8.6%)	65 (5.6%)	0.16
Secondary Endpoints:			
VF/VT and Death	40 (12.9%)	102 (11.3%)	0.45
1st inappropriate shock	12 (3.9%)	23 (2.1%)	0.2

CLINICAL OUTCOME– DEATH
BY THRESHOLD TESTING

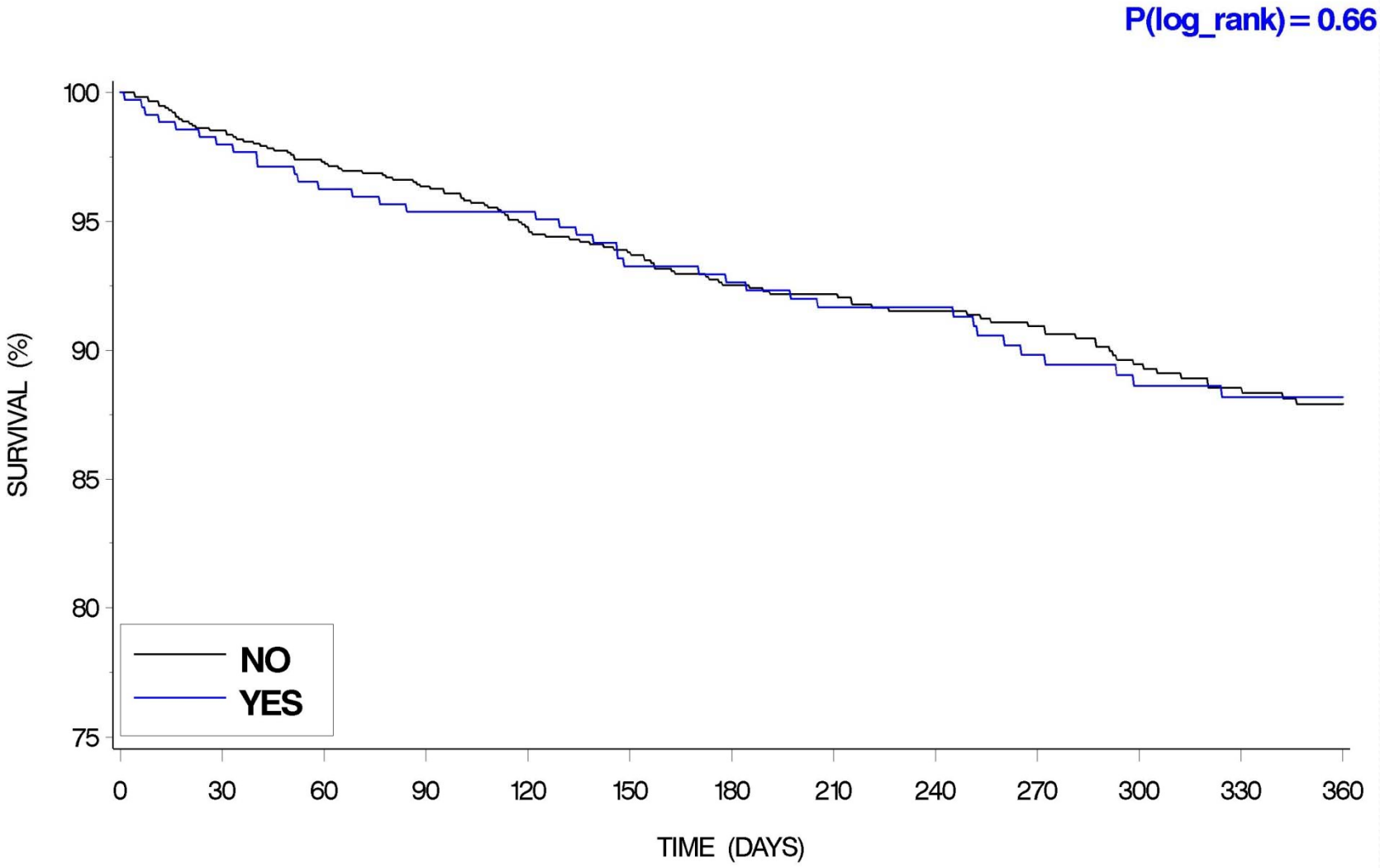


CLINICAL OUTCOME—VTVF
BY THRESHOLD TESTING

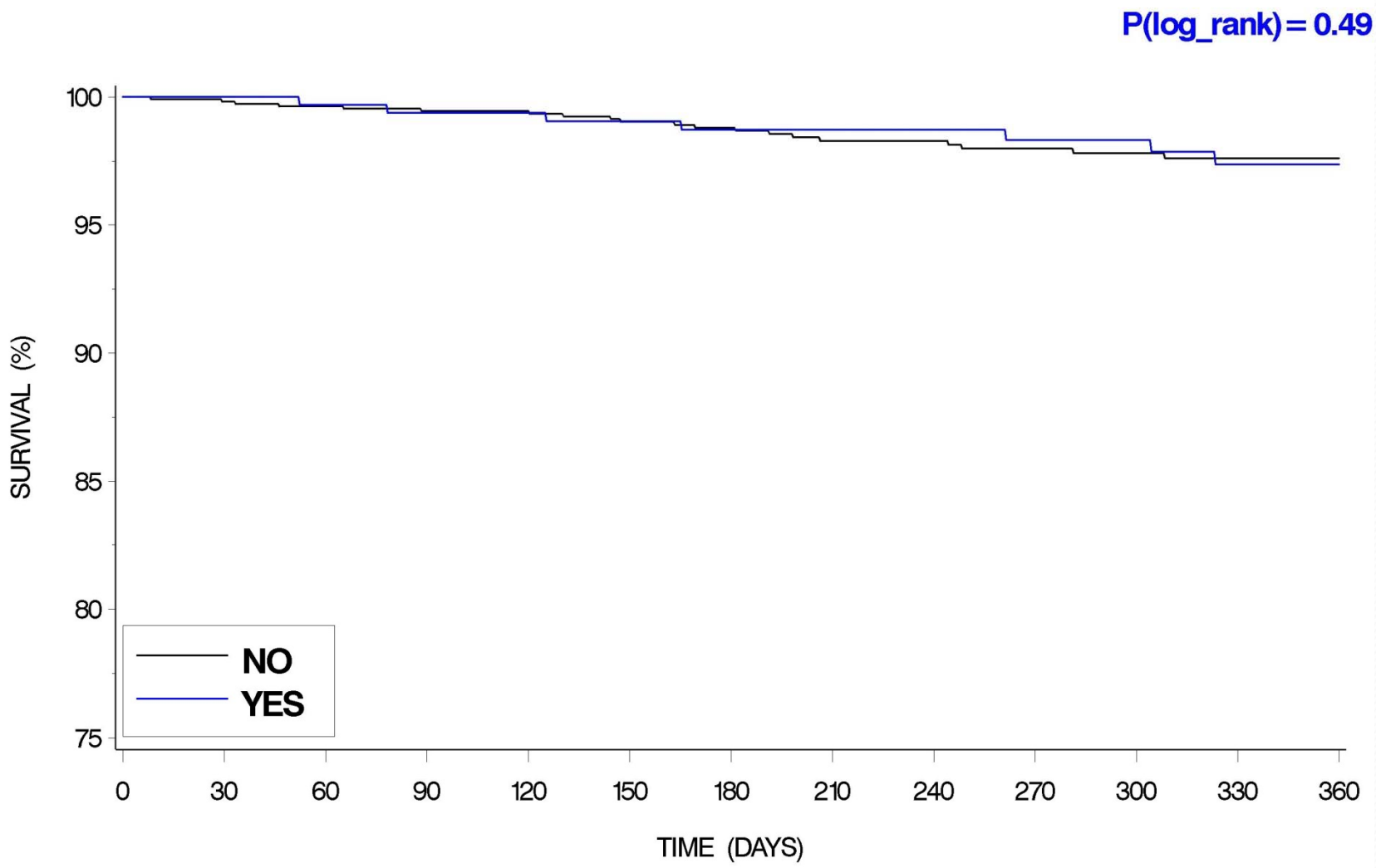
P(log_rank) = 0.29



CLINICAL OUTCOME—VTVF OR DEATH BY THRESHOLD TESTING



CLINICAL OUTCOME – 1ST INAPPROPRIATE THERAPY BY THRESHOLD TESTING



Discussion

- DFT testing was performed in 17% of the pts. during ICD implantation.
- A large proportion of pts. did not undergo testing as also reported recently from other series
- Predictors of ICD testing were: younger age and secondary prevention ICD
- Predictors against DFT testing: CRT-D, Ischemic heart disease, AF.

Discussion

- The common practice of Israeli centers - over 80% of all ICDs were implanted without intraoperative DFT testing, mostly in CRT-D implants.
- DFT testing did not affect Patient outcomes.
- No differences in of death, appropriate or inappropriate therapies
- In our opinion, it is reasonable to apply a restrictive approach to DFT testing.

Limitations

- Lack of randomization
- Retrospective nature
- Small number of endpoints reached.
- Short Follow-up time