Permanent atrial fibrillation development in long-term follow-up of DDD patients: the incidence and predisposing factors

Maciej Dębski, Mateusz Ulman, Andrzej Ząbek,

Kazimierz Haberka, Jacek Lelakowski, Barbara Małecka

Department of Electrocardiology, John Paul II Hospital
Institute of Cardiology, Jagiellonian University Collegium Medicum
Cracow, Poland

Prospective studies

	Patients [N]	SSS [%]	AVB [%]	Paroxysmal AF [%]	FU; mean ± SD [years]	Permanent AF [%]
1	254	0	100	0	2	8.7
2	708	100	0	45	5.4 ± 2.6	10.7
3	231	59	34	63	2 ± 1	8.0
4	1094	35	52	21	3	2.8/year
5	117	35	62	0	3 ± 2.3	3.6
6	1014	100	11	47	2.7	15.2
	3418			**0 - 63**	**2 - 5.4**	**3.6 – 15.2**

1. Marchandise S, et al. Europace. 2012.
2. Nielsen JC, et al. Eur Heart J. 2011.
3. Gillis AM, et al. J Cardiovasc Electrophysiol. 2002.
4. Skanes AC, et al. J Am Coll Cardiol. 2001.
5. Saccomanno G, et al. Arch Gerontol Geriatr. 1995.
6. Lamas GA, et al. N Engl J Med. 2002.

Retrospective studies - incidence

	Patients [N]	SSS [%]	AVB [%]	Paroxysmal AF [%]	FU; mean ± SD [range] [years]	Permanent AF [%]
1	249	25	72	0	2.7 [1-10]	12.0
2	486	38	62	8	2.7 [1-8]	9.9
3	376	100	0	74	5 ± 3 [1-11]	17
4	657	18	76	-	7 [1-15]	5.8
5	101	100	0	37	7.6 ± 4.7 [1-18]	11.8
6	581	53	47	18	2.5 [1-8]	4.0
	2450			**0 - 74**	**2.5 - 7.6 [1 - 18]**	**4 - 12**

1. Ibrahim B, et al. Br Heart J. 1995.
2. Gross JN, et al. J Am Coll Cardiol. 1992.
3. Sgarbossa EB, et al. Circulation. 1993.
4. Martinelli M, et al. Arq Bras Cardiol. 2001.
5. Masumoto H, et al. Europace. 2004.
6. Hesselson AB, et al. J Am Coll Cardiol. 1992.

Risk factors

Study	SSS	Prior paroxysmal AF	Age at implantation
Gillis AM, et al. J Cardiovasc Electrophysiol. 2002	✓	✓	x
Nielsen JC, et al. Eur Heart J. 2011		✓	
Skanes AC, et al. J Am Coll Cardiol. 2001	✓	✓	✓
Gross JN, et al. J Am Coll Cardiol. 1992	✓	✓	x
Hesselson AB, et al. J Am Coll Cardiol. 1992	✓		x
Masumoto H, et al. Europace. 2004		✓	
Sgarbossa EB, et al. Circulation. 1993		✓	✓

✓ - factor statistically significant

x - factor insignificant

Objective

We retrospectively analyzed the incidence of:

- Permanent atrial fibrillation (AF)

We assessed the following clinical variables:

- Gender
- Indications: SSS and AVB
- History of paroxysmal AF
- Age at implantation

Study population

- 1049 consecutive DDD implantations between **1984-2002**
- **995** patients included (at least one follow-up visit)
- Follow-up period until March **2014**

- Mean age ± SD: 63.5 ± 12.4 years
- Male patients: 56.7%
- Indications: SSS 77%, AVB 48%
- Paroxysmal AF: 26%

Definition

- **Permanent AF:**

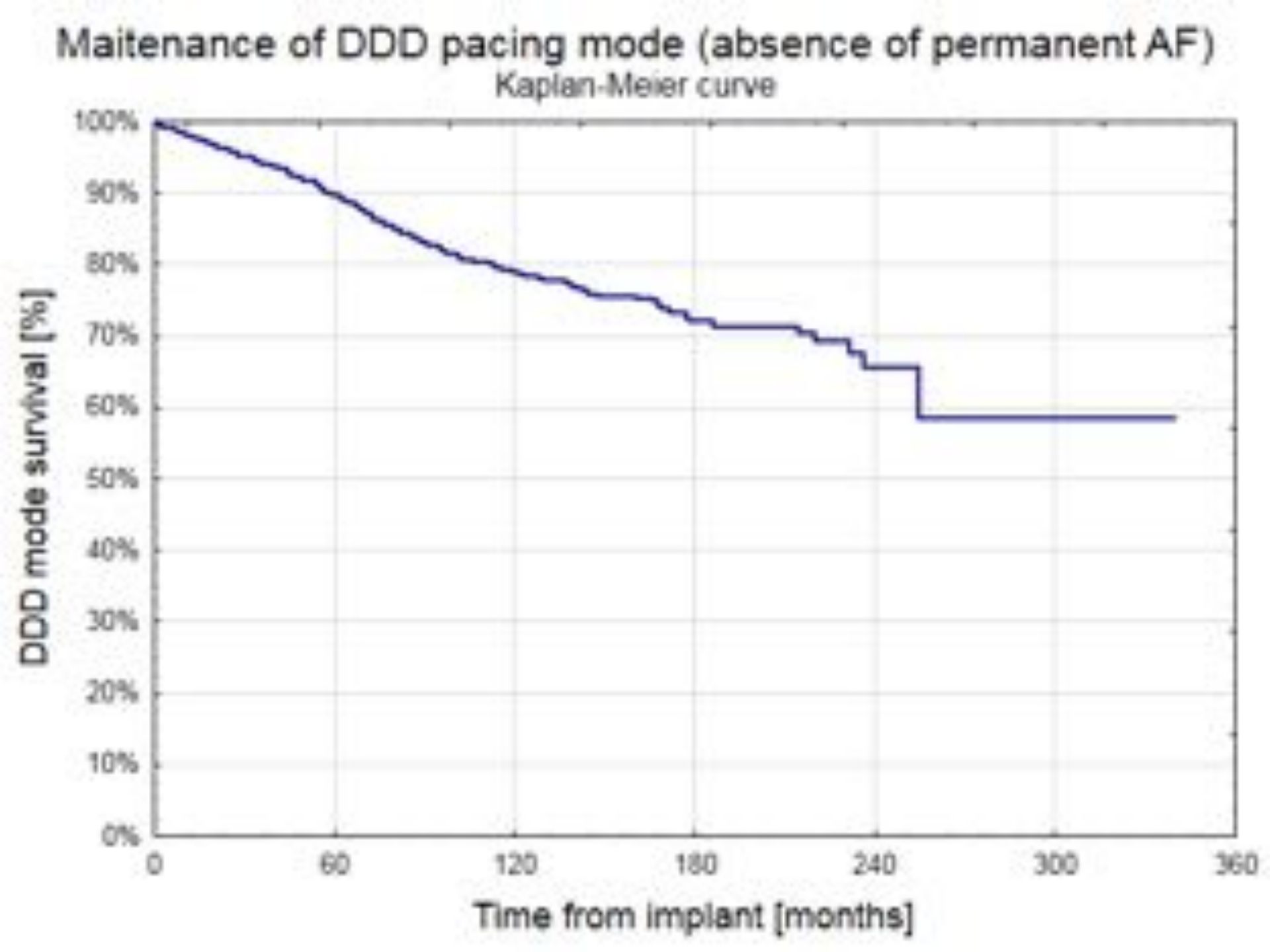
➢ *when VVI programming was necessary*

Results

1. Follow-up duration:
   124.2 ± 68.3 months [1-340 months].

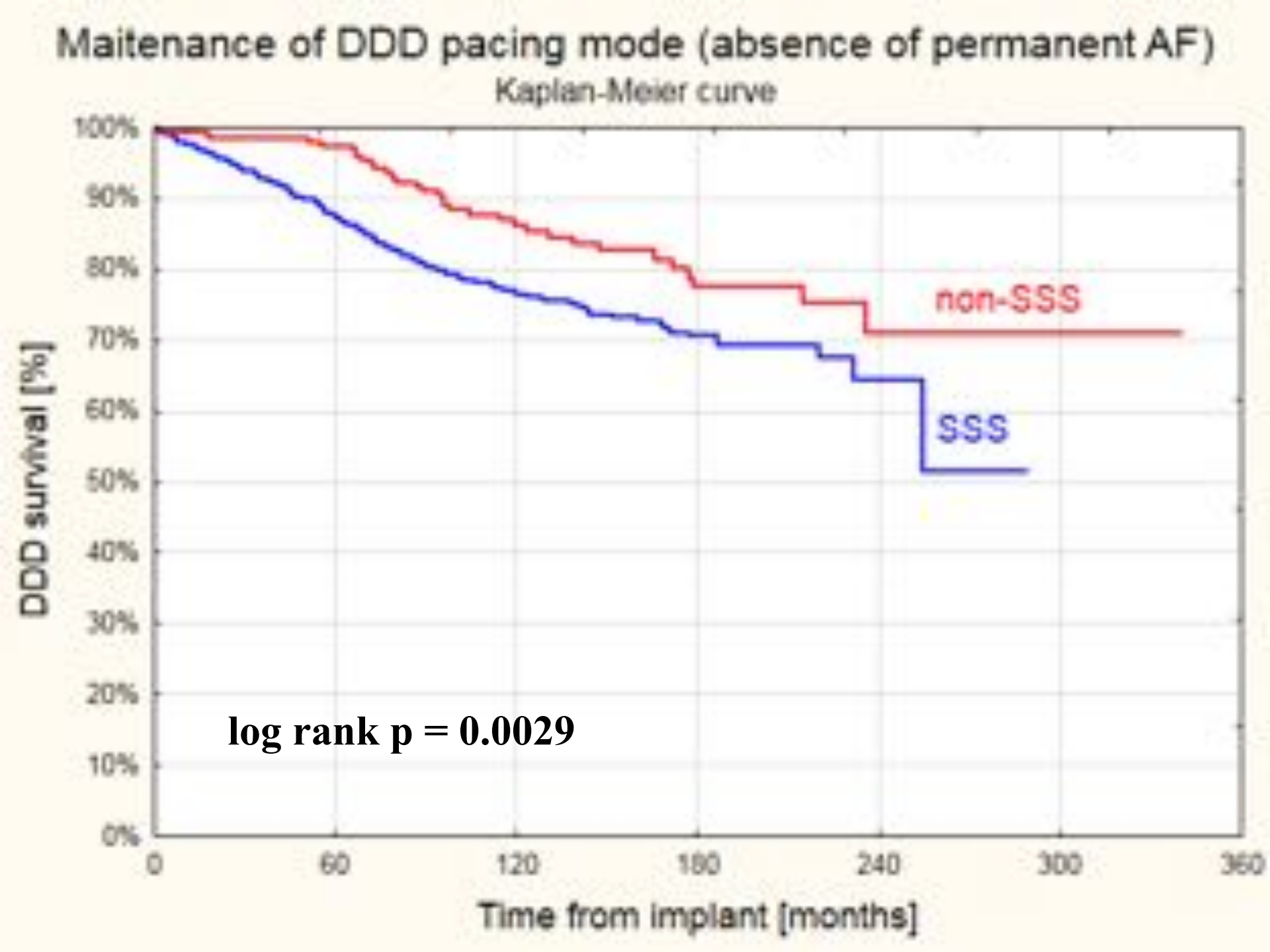
2. Permanent AF occurred in 207 patients
   (20.8%) after a mean of 74.7 ± 52.1 months.

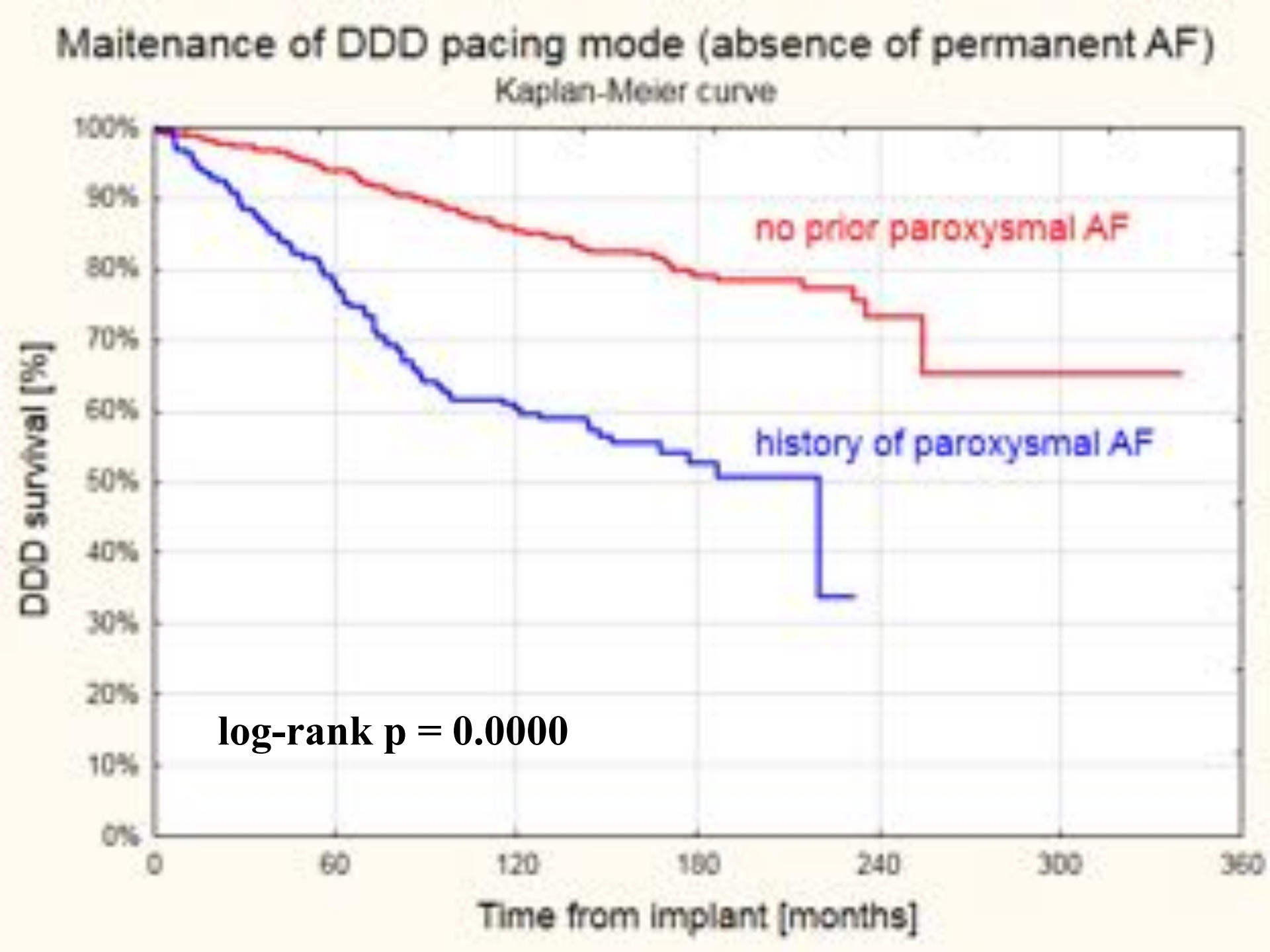
3. After 1, 5, 10, 15 years DDD mode was
   preserved in 97.7%, 90.0%, 79.1% and
   71.7%, respectively.


Maitenance of DDD pacing mode (absence of permanent AF)
Kaplan-Meier curve
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
DDD mode survival [%]
0
60
120
180
240
300
360
Time from implant [months]

Comparison of patients who developed permanent AF with those who remained in sinus rhythm.

Parameter	Patients with permanent AF (N=207)	Patients in sinus rhythm (N=788)	p
AVB [N,%]	92 (44%)	389 (49%)	0.2074
SSS [N,%]	177 (86%)	591 (75%)	**0.0014**
History of paroxysmal AF [N,%]	98 (47%)	156 (20%)	**0.0000**
Age at implantation mean ± SD [years]	67.3 ± 9.2	62.6 ± 12.9	**0.0000**
Men [N,%]	105 (51%)	452 (57%)	0.0870


Maitenance of DDD pacing mode (absence of permanent AF)
Kaplan-Meier curve
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
DDD survival [%]
non-SSS
SSS
log rank p = 0.0029
0
60
120
180
240
300
360
Time from implant [months]


Maitenance of DDD pacing mode (absence of permanent AF)
Kaplan-Meier curve
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
DDD survival [%]
no prior paroxysmal AF
history of paroxysmal AF
log-rank p = 0.0000
0
60
120
180
240
300
360
Time from implant [months]

Multivariate analysis

Parameter	HR	95% CI	p
Male gender	1.09	0.82 - 1.43	0.5616
AVB	1.28	0.93 - 1.75	0.1275
SSS	1.70	1.09 - 2.65	**0.0190**
History of paroxysmal AF	3.05	2.29 - 4.07	**0.0000**
Implantation at age over 65 years old	2.24	1.67 - 3.02	**0.0000**

Conclusions

1. The loss of physiologic pacing due to development of permanent AF occurred in 20.8% of DDD patients.

2. The risk factors which predispose to permanent AF development are:
   - Sick sinus syndrome
   - History of paroxysmal AF
   - Implantation at older age

Discussion

	Patients [N]	SSS [%]	AVB [%]	Paroxysmal AF [%]	FU; mean ± SD [range] [years]	Permanent AF [%]
1	249	25	72	0	2.7 [1-10]	12.0
2	486	38	62	8	2.7 [1-8]	9.9
3	376	100	0	74	5 ± 3 [1-11]	17
4	657	18	76	-	7 [1-15]	5.8
5	101	100	0	37	7.6 ± 4.7 [1-18]	11.8
6	581	53	47	18	2.5 [1-8]	4.0
7	**995**	**77**	**48**	**26**	**10 ± 5.7 [1-28]**	**20.8**

1. Ibrahim B, et al. Br Heart J. 1995.
2. Gross JN, et al. J Am Coll Cardiol. 1992.
3. Sgarbossa EB, et al. Circulation. 1993.
4. Martinelli M, et al. Arq Bras Cardiol. 2001.
5. Masumoto H, et al. Europace. 2004.
6. Hesselson AB, et al. J Am Coll Cardiol. 1992.
7. **PRESENT STUDY**

Discussion

Study	SSS	Prior paroxysmal AF	Age at implantation
Gillis AM, et al. J Cardiovasc Electrophysiol. 2002	✓	✓	x
Nielsen JC, et al. Eur Heart J. 2011		✓	
Skanes AC, et al. J Am Coll Cardiol. 2001	✓	✓	✓
Gross JN, et al. J Am Coll Cardiol. 1992	✓	✓	x
Hesselson AB, et al. J Am Coll Cardiol. 1992	✓		x
Masumoto H, et al. Europace. 2004		✓	
Sgarbossa EB, et al. Circulation. 1993		✓	✓
PRESENT STUDY	✓	✓	✓

✓ - factor statistically significant

x - factor insignificant

Thank you for your attention