

German Pacemaker Register

Tables and figures 1982 - 2001

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October 2003 (see Tables and charts since 2000).

1. ORGANISATION

1.1. Introduction

Since 1982, the German Pacemaker Register has collected data of pacemaker implantations and pulse generator exchanges based on the European Pacemaker Patient Identification Card of the International Association of Pacemaker Manufacturers/European Working Group of Cardiac Pacing (IAPM/EWGCP). Data is sent on a voluntary basis which implies that the information is incomplete, and represents approximately 30 – 40% of all pacemaker operations in Germany throughout the years. However, a comparison with the number of pulse generators sold in Germany, in particular the distribution of single- and dual chamber devices, shows that the data of the German Pacemaker Register provides information close to clinical reality in Germany. In addition, the German Pacemaker Register has collected more than 400.000 data sets, thus representing the largest pacemaker registry worldwide. So, it appears justified to publish the following tables and graphs, although they represent a less than 100% data collection.

From 1980 to 1999, data was collected and analyzed by Prof. Dr. Ing. W. Irnich and his coworkers Dr. L. Batz and Dr. W.A. Stertmann, and published in the journal „Herzschrittmacher“. Data is additionally available at <http://www.med.uni-giessen.de/technik/index.html>.

Since 2000, with the retirement of Professor Irnich and at a time when the national quality assurance program became effective in Germany, data is collected by the German Federal Institute for Quality Assurance, BQS gGmbH, Duesseldorf, and analyzed by the BQS specialist group on cardiac pacing. Data is published in the journal „Herzschrittmacher&Elektrophysiologie“ and is additionally available at <http://www.pacemaker-register.de>.

The basis of this collection of tables and graphs is:

1. the annual reports by Irnich and co-workers from 1983 - 2000, which were somewhat modified due to formal reasons, and
2. data collected by the BQS in 2000 and 2001. Most data was submitted as a copy of the European Pacemaker Patient Identification Card of the International Association of Pacemaker Manufacturers/European Working Group of Cardiac Pacing (IAPM/EWGCP). Some were sent as a copy of pacemaker identification cards provided by the different manufacturers, self-designed data sheets, or copies of the operation report. Data was submitted mostly by hospitals, in single cases by doctors operating outside hospitals as well.
3. Since 2002, data has been and is submitted electronically as a data set based on the quality assurance of pacemaker implantations (modul 09/1 of the German Quality Assurance Program), pulse generator replacements (modul 09/2 of the German Quality

Assurance Program) and pacemaker reoperations (modul 09/3 of the German Quality Assurance Program). Submission of this data is obligatory and non-submission will be fined in 2003 on the basis of a law (§137, 5th volume of the German social welfare code (SGB V)). Analysis of this data will provide additional information about the procedure and its results, e.g. operation time or fluoroscopy time. This implies that the structure of the report of the German pacemaker Register will be modified in 2003.

1.2. Data base

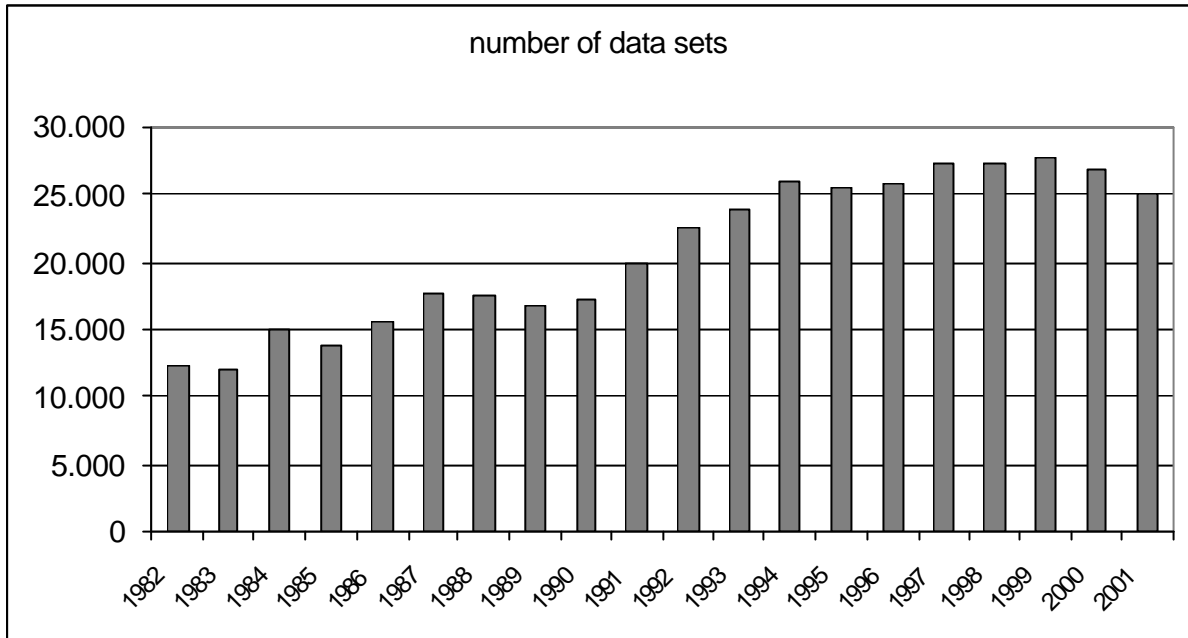
1.2.1. Overview

	Total	Mean	SD	Median	Minimum	Maximum
First implantations	380.063	19.003	4.660	19.574	11.467	25.465
Replacements/explantations	35.593	1.873	908	1.800	529	4.163
Total	415.656	20.783	5.394	21.204	11.996	27.686
Participating institutions		471	143	537	106	651

	First implantations	Replacements/ explantations	Total	Participating institutions
1982	12.312		12.312	106
1983	11.467	529	11.996	276
1984	14.063	954	15.017	283
1985	12.903	895	13.798	302
1986	14.457	1.118	15.575	355
1987	16.167	1.487	17.654	385
1988	16.271	1.326	17.597	403
1989	15.317	1.398	16.715	436
1990	15.736	1.520	17.256	488
1991	18.501	1.460	19.961	534
1992	20.646	1.800	22.446	562
1993	21.916	2.005	23.921	646
1994	23.845	2.125	25.970	651
1995	23.327	2.116	25.443	619
1996	23.594	2.172	25.766	588
1997	25.113	2.240	27.353	575
1998	25.244	2.009	27.253	559
1999	25.465	2.221	27.686	540
2000	22.792	4.055	26.847	562
2001	20.927	4.163	25.090	544

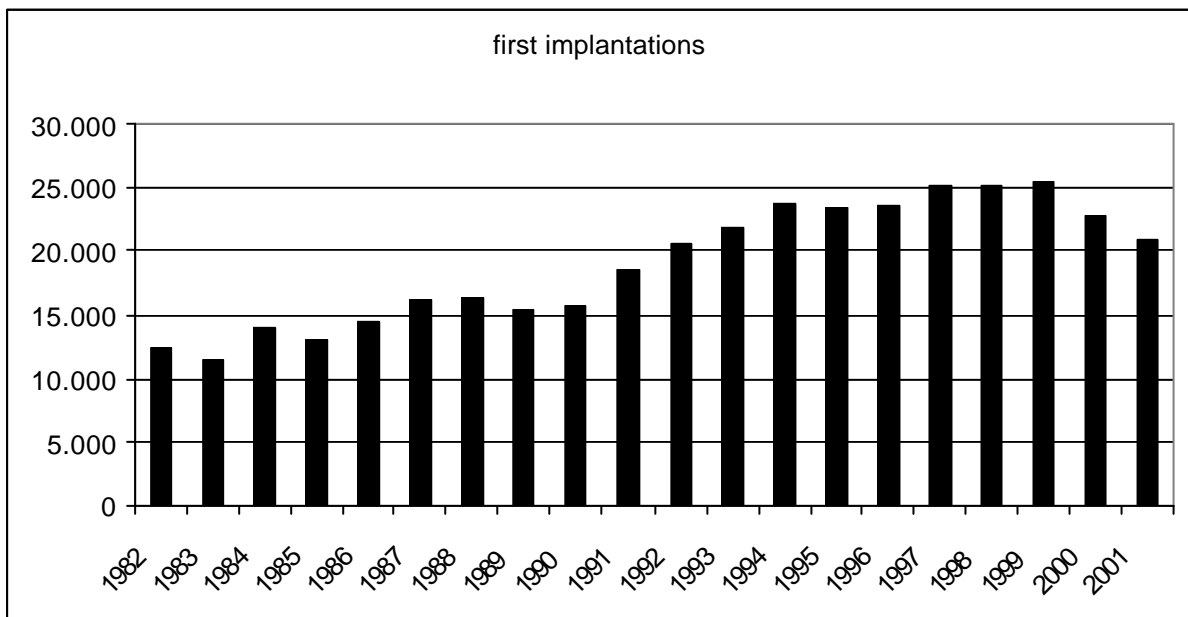
1.2.2. Total number of data sets

	Total	Mean	SD	Median	Mininum	Maximum
Data sets	415.656	20.783	5.394	21.204	11.996	27.686



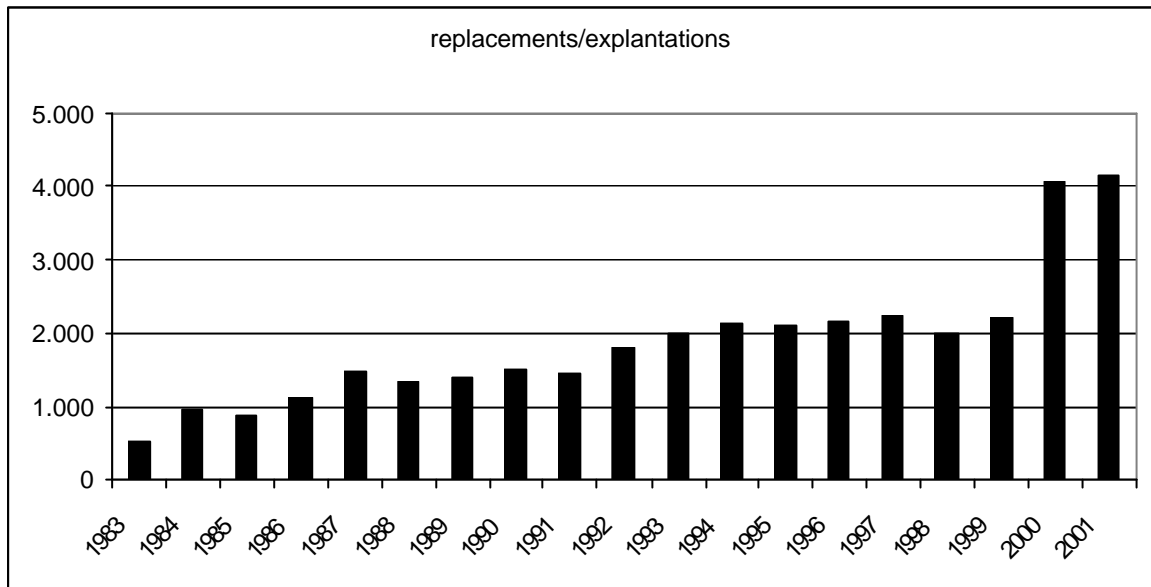
1.2.3. First implantations

	Total	Mean	SD	Median	Minimum	Maximum
First implantations	380.063	19.003	4.660	19.574	11.467	25.465



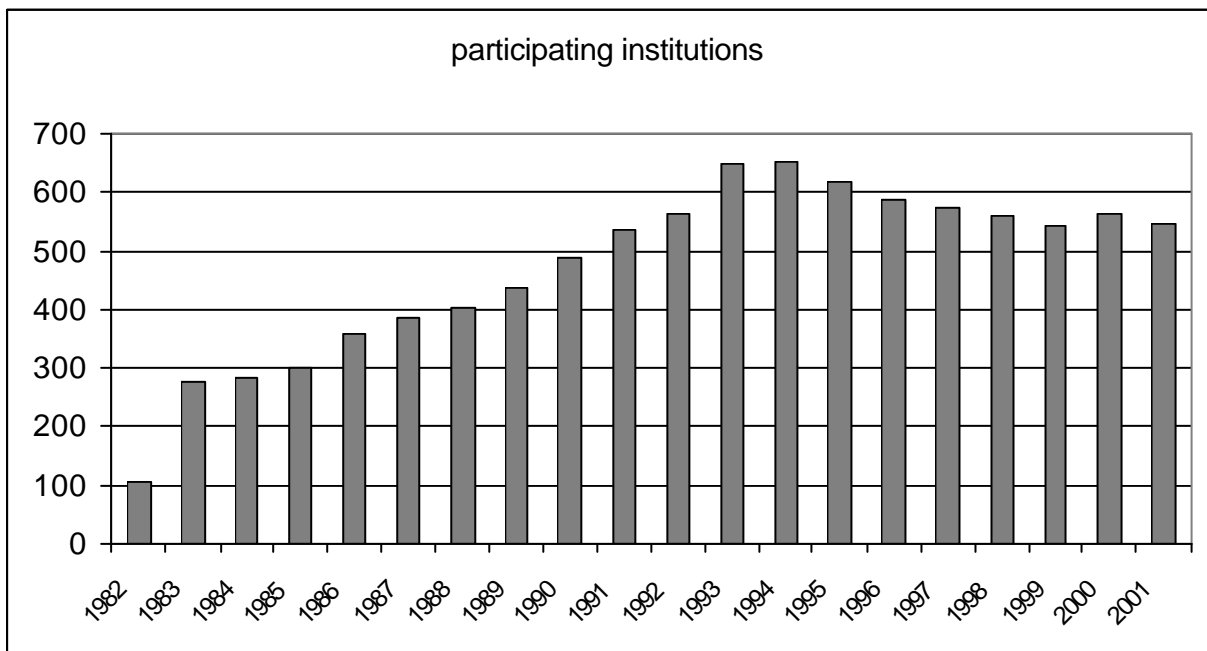
1.2.4. Replacements/explantations

	Total	Mean	SD	Median	Minimum	Maximum
Replacements/explantations	35.593	1.873	908	1.800	529	4.163



1.2.5. Participating institutions

	Mean	SD	Median	Minimum	Maximum
Participating institutions	471	143	537	106	651



FIRST IMPLANTATIONS

2.1. Demographic data

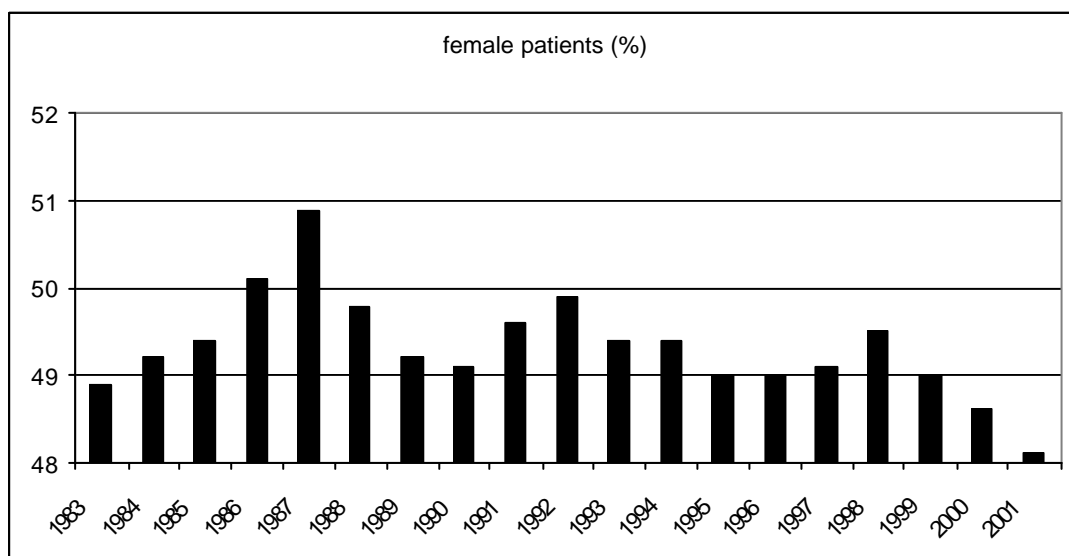
2.1.1. Overview

	male patients (%)	female patients (%)	mean age men (years)	mean age women (years)	mean age total (years)
1982			70,9	72,9	
1983	51,1	48,9	71,0	73,1	71,9
1984	50,8	49,2	71,1	73,1	72,0
1985	50,6	49,4	71,9	74,2	72,1
1986	49,9	50,1	72,3	74,7	73,1
1987	49,1	50,9	72,4	75,1	73,5
1988	50,2	49,8	72,3	75,1	73,7
1989	50,8	49,2	72,5	75,4	73,7
1990	50,9	49,1	72,4	75,2	73,9
1991	50,4	49,6	72,0	75,3	73,8
1992	50,1	49,9	72,2	75,3	73,6
1993	50,6	49,4	72,4	75,5	73,7
1994	50,6	49,4	72,1	75,6	74,0
1995	51,0	49,0	72,5	76,0	73,8
1996	51,0	49,0	72,8	76,1	74,2
1997	50,9	49,1	72,8	76,3	74,4
1998	50,5	49,5	72,9	76,5	74,6
1999	51,0	49,0	72,7	76,4	74,7
2000	51,4	48,6	73,1	76,8	74,8
2001	51,9	48,1	73,3	77,1	75,0

2.1.2. Female/male ratio

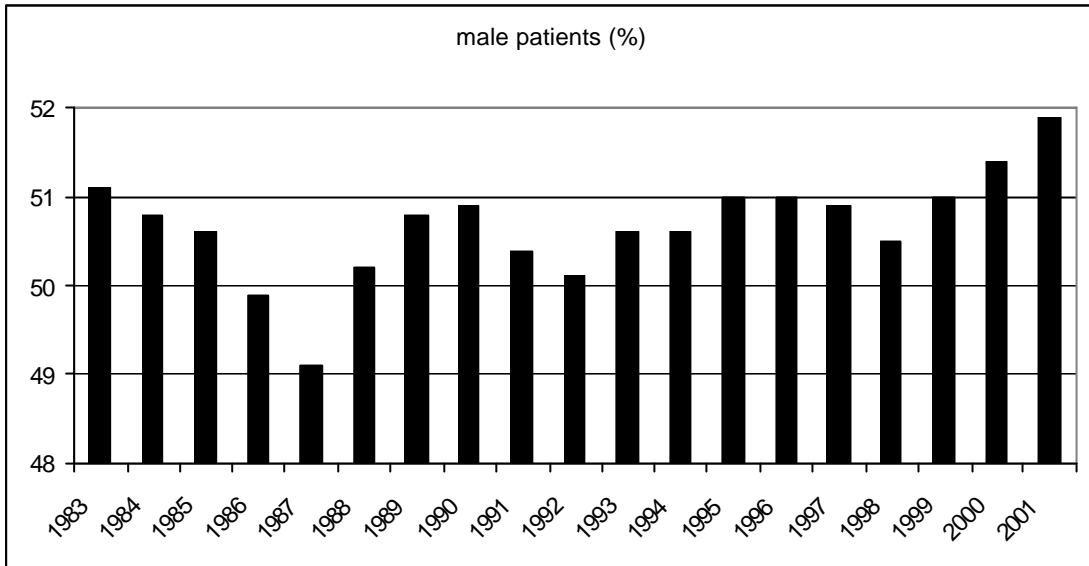
2.1.2.1. Female patients

	Mean	SD	Median	Minimum	Maximum
Female patients (%)	49,3	0,6	49,2	48,1	50,9



2.1.2.2. Male patients

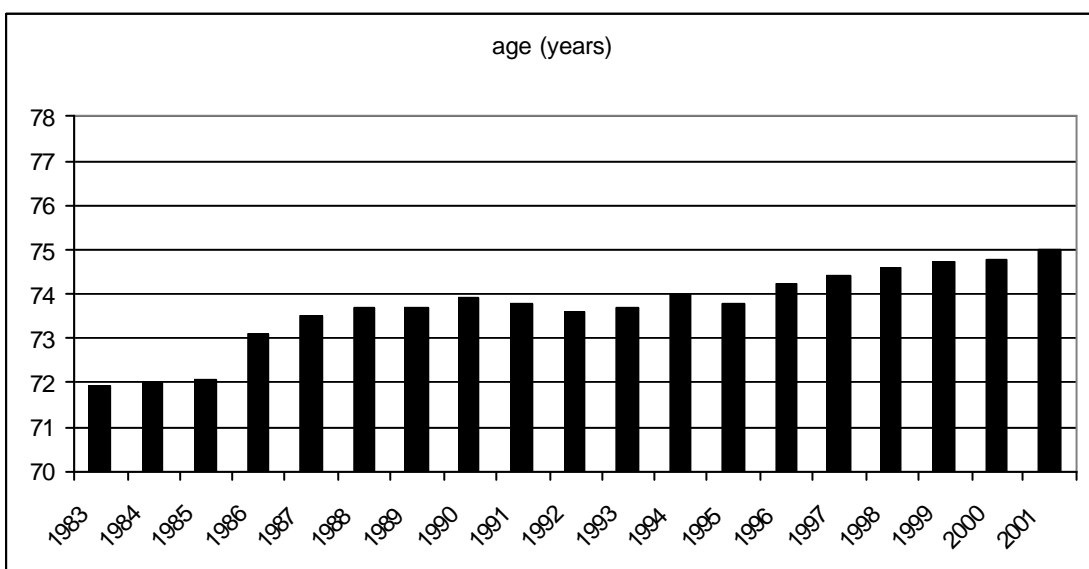
	Mean	SD	Median	Minimum	Maximum
Male patients (%)	50,7	0,6	50,8	49,1	51,9



2.1.3. Age

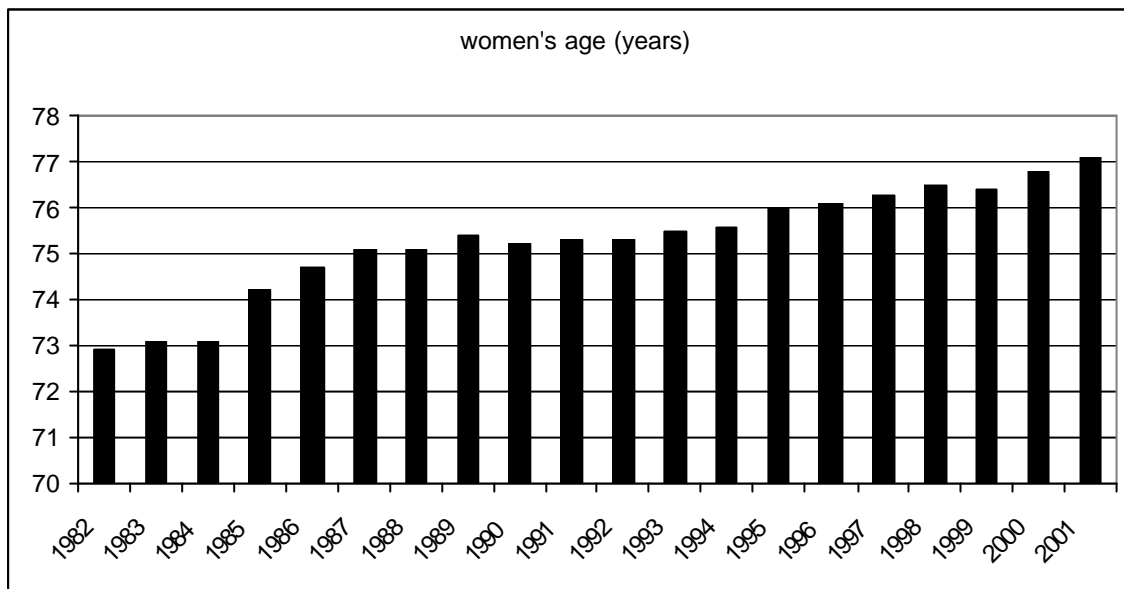
2.1.3.1. Age of all patients

	Mean	SD	Median	Minimum	Maximum
Age (years)	73,7	0,9	73,8	71,9	75,0



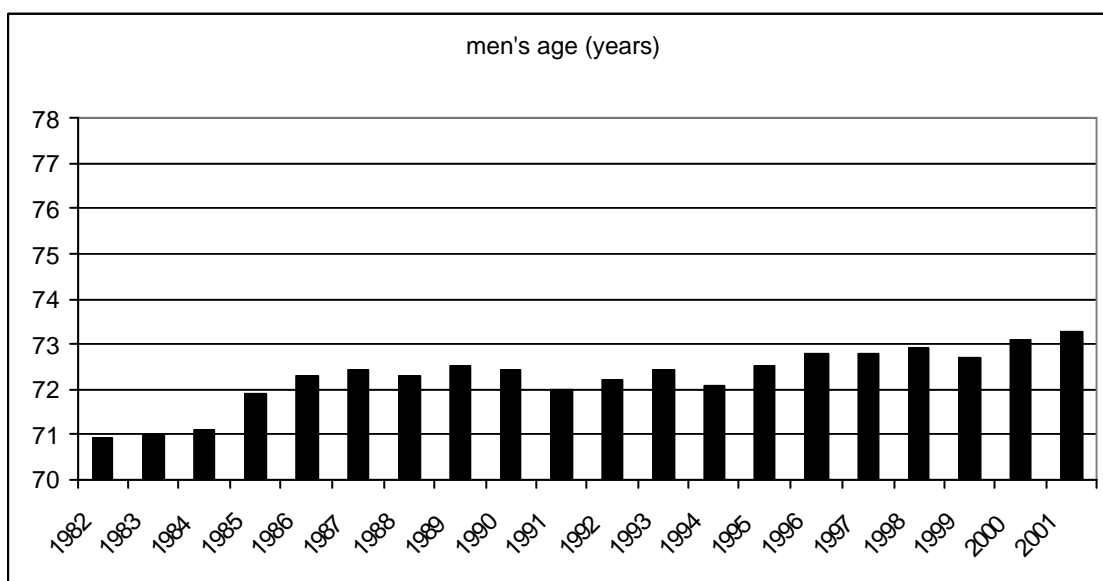
2.1.3.2. Women's age

	Mean	SD	Median	Minimum	Maximum
Women's age (years)	75,3	1,2	75,4	72,9	77,1



2.2.3.3. Men's age

	Mean	SD	Median	Minimum	Maximum
Men's age (years)	72,3	0,6	72,4	70,9	73,3



2.2. ECG-Indications

2.2.1. Overview

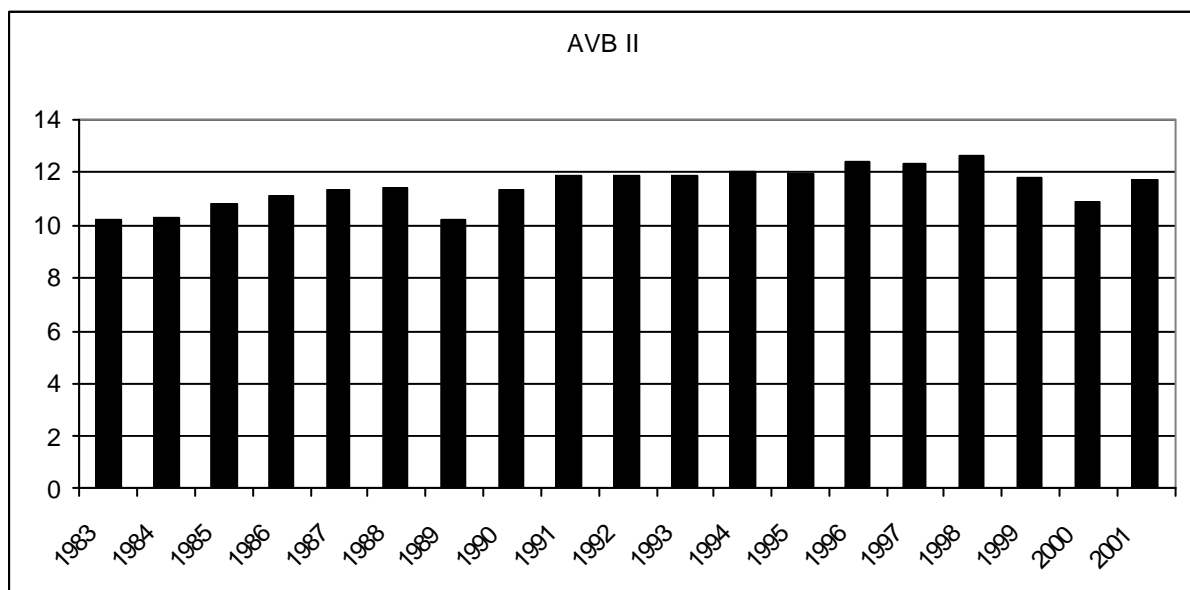
	AVB II	AVB III	Total AVB	SSS	SSS+AVB	BTS	AF+Brady
1983	10,2	25,5	35,7	36,7	2,4	7,8	17,4
1984	10,3	25,8	36,1	36,9	2,5	7,2	17,2
1985	10,8	26,1	36,9	35,6	2,4	6,5	18,6
1986	11,1	25,9	37,0	34,3	3,0	7,3	18,4
1987	11,3	24,2	35,5	33,7	2,9	8,9	19,0
1988	11,4	25,1	36,5	32,7	3,5	8,8	18,5
1989	10,2	27,8	38,0	37,0	0,9	4,8	19,3
1990	11,3	27,1	38,4	30,7	0,3	10,4	20,2
1991	11,9	27,0	38,9	29,8	0,2	11,0	20,2
1992	11,9	25,9	37,8	29,6	0,2	11,0	21,4
1993	11,9	26,2	38,1	27,6	0,5	12,5	21,3
1994	12,0	24,9	36,9	27,9	0,9	12,4	21,8
1995	12,0	24,6	36,6	27,3	1,0	11,8	23,3
1996	12,4	24,2	36,6	27,5	1,0	12,9	22,0
1997	12,3	24,2	36,5	27,0	0,7	13,0	22,8
1998	12,6	24,4	37,9	27,6	0,9	12,8	22,5
1999	11,8	23,5	35,4	27,3	2,1	12,6	22,6
2000	10,9	23,0	33,9	27,1	2,0	13,3	23,7
2001	11,7	22,8	34,5	27,4	2,2	12,4	23,6

AVB = AV-block, SSS = Sick sinus syndrome, BTS = Bradycardia/tachycardia-syndrome, AF = atrial flutter/fibrillation, Brady = Bradycardia

2.2.2. AV-block

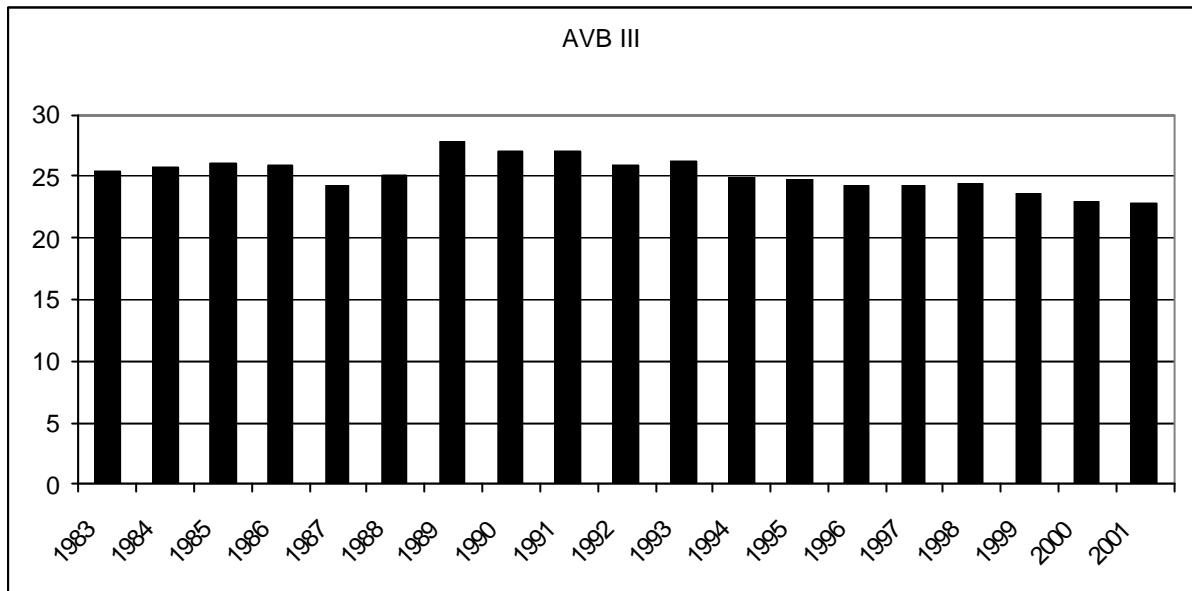
2.2.2.1. AV-block II (C2 – C4)

	Mean	SD	Median	Minimum	Maximum
AVB II	11,5	0,7	11,7	10,2	12,6



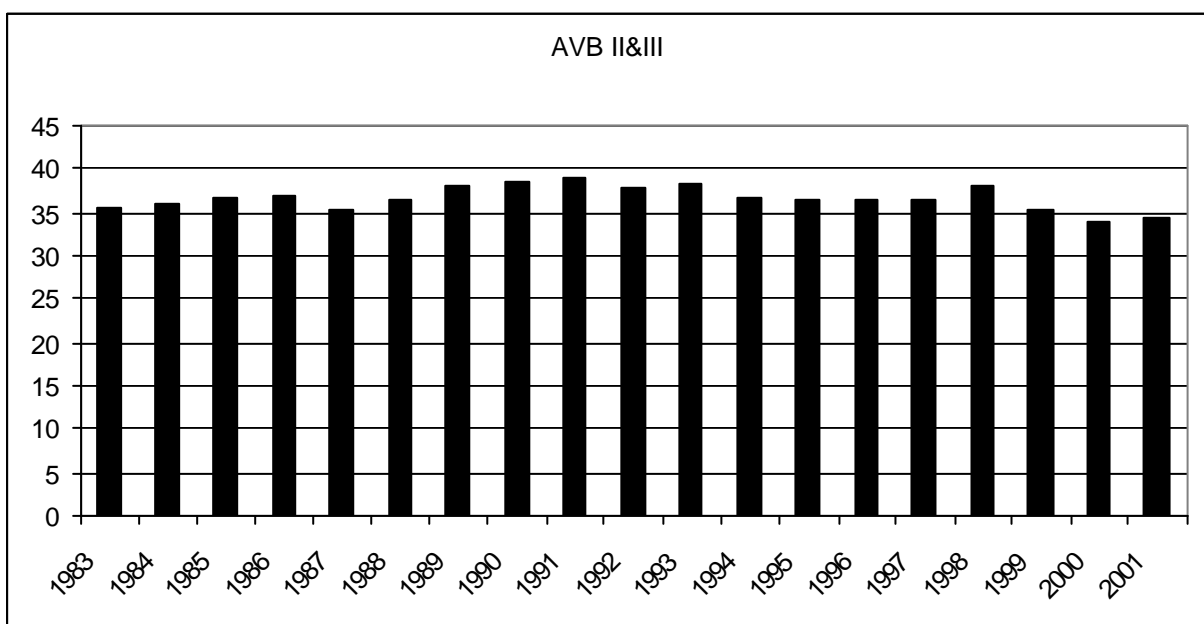
2.2.2.2. AV-block III (C5 – C7)

	Mean	SD	Median	Minimum	Maximum
AVB III	25,2	1,4	25,1	22,8	27,8



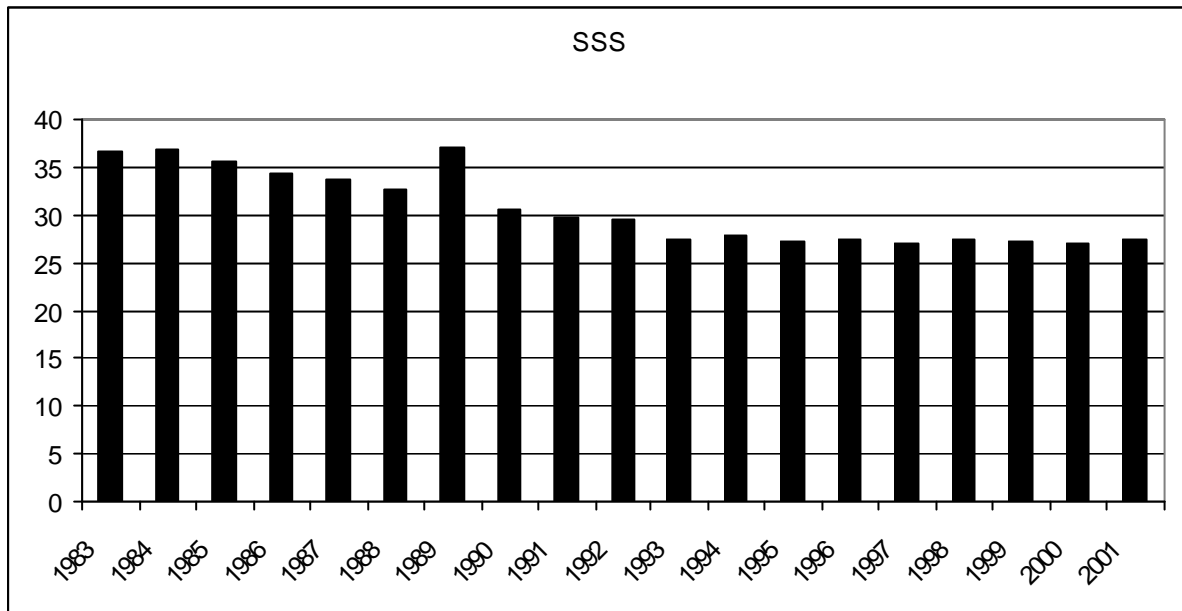
2.2.2.3. Total AV-block II&III (C2 – C7)

	Mean	SD	Median	Minimum	Maximum
AVBII&III	36,7	1,3	36,6	33,9	38,9



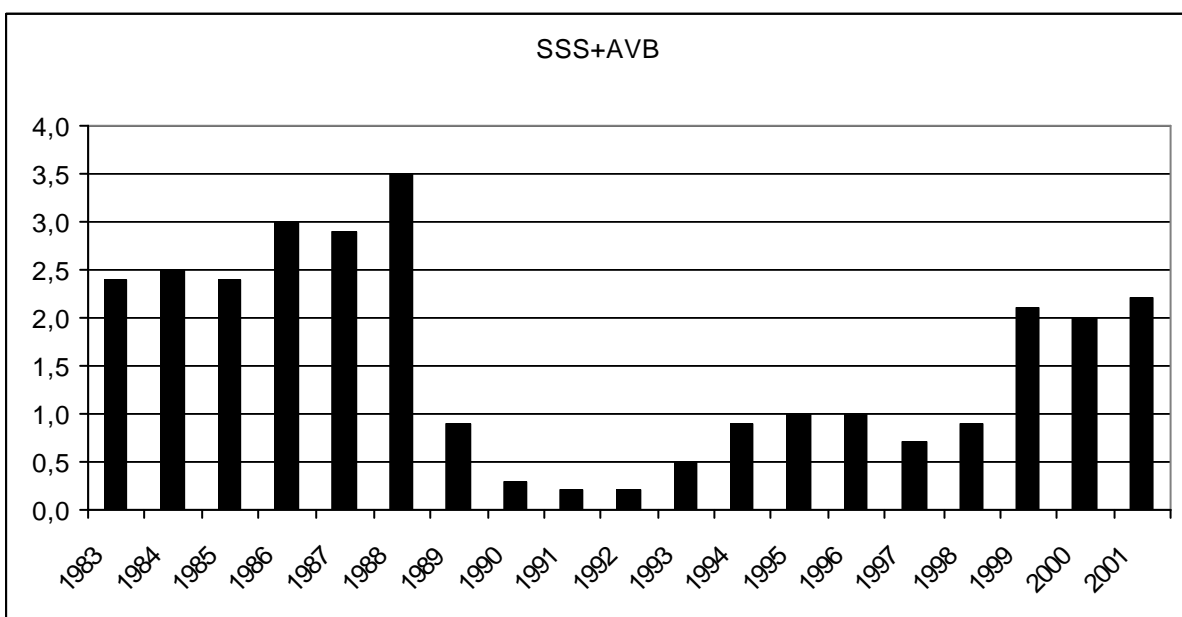
2.2.3. Sick sinus syndrome (E1 – E4)

	Mean	SD	Median	Minimum	Maximum
SSS	30,7	3,7	29,6	27,0	37,0



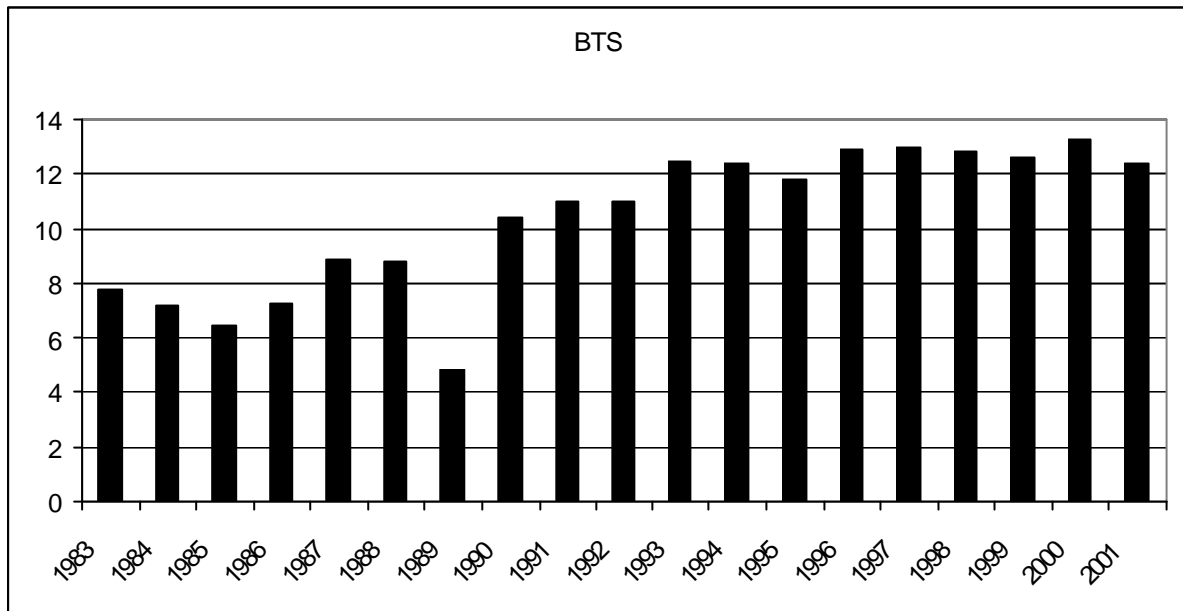
2.2.4. Sick sinus syndrome and AV-block (Binodal disease) (E7)

	Mean	SD	Median	Minimum	Maximum
SSS+AVB	1,6	1,0	1,0	0,2	3,5



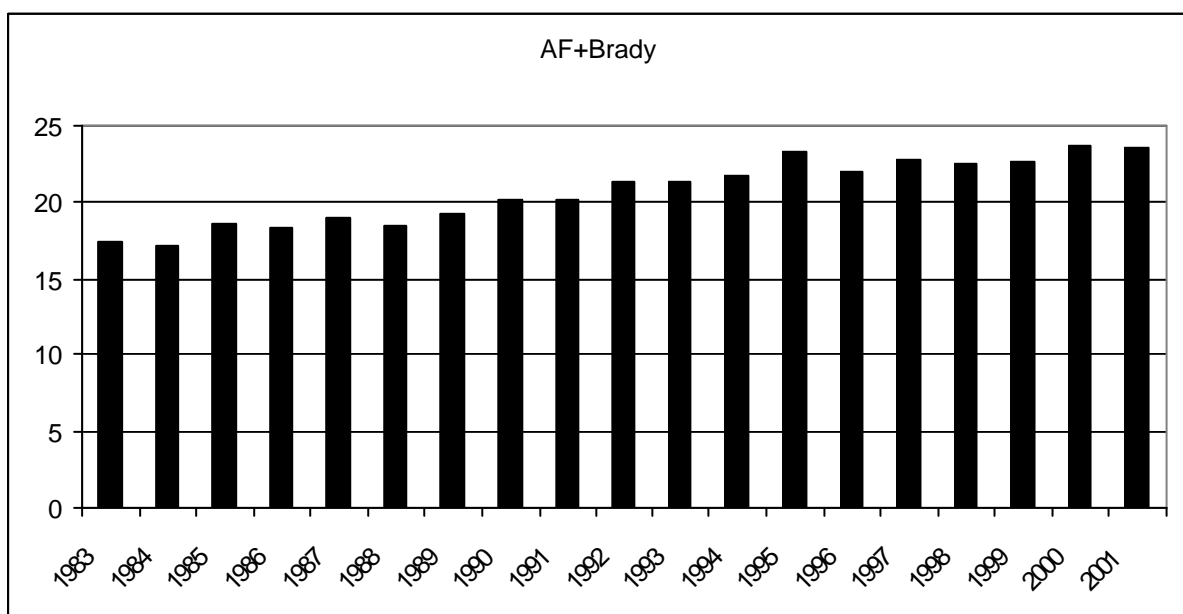
2.2.5. Bradycardia/tachycardia-syndrome (E5)

	Mean	SD	Median	Minimum	Maximum
BTS	10,4	2,6	11,0	4,8	13,3



2.2.6. Atrial flutter/fibrillation + bradycardia (E6)

	Mean	SD	Median	Minimum	Maximum
AF+Brady	20,7	2,1	21,3	17,2	23,7



2.3. Mode of pacing

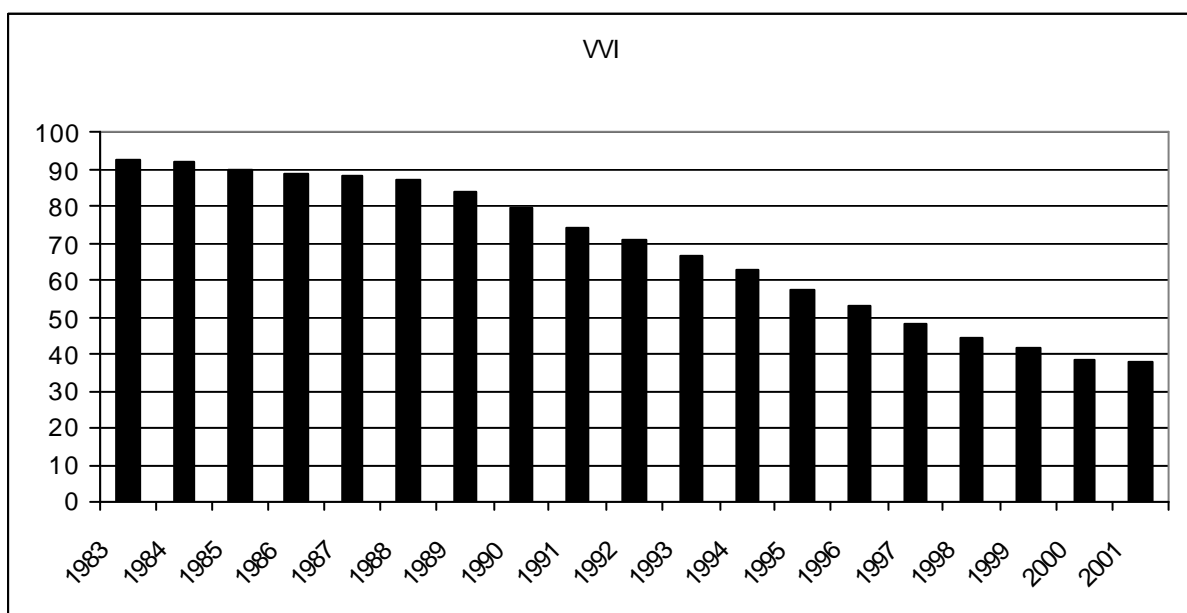
2.3.1. Overview

	VVI	AAI	DDD	VDD	SCP	DCP	Physiologic	RR
1983	92,6	2,1	4,8	0,3	94,7	5,1	7,2	0,0
1984	92,2	1,3	6,3	0,1	93,5	6,4	7,7	0,0
1985	89,5	1,5	9,0	0,0	91,0	9,0	10,5	0,0
1986	88,5	1,8	9,7	0,0	90,3	9,7	11,5	0,0
1987	87,9	2,0	9,8	0,0	89,9	9,8	11,8	4,0
1988	87,5	1,6	10,9	0,0	89,1	10,9	12,5	6,1
1989	83,8	1,8	14,4	0,0	85,6	14,4	16,2	6,9
1990	79,2	3,3	17,5	0,0	82,5	17,5	20,8	13,4
1991	74,3	3,5	22,2	0,0	77,8	22,2	25,7	19,3
1992	70,8	3,0	26,2	0,0	73,8	26,2	29,2	22,5
1993	66,1	3,1	29,9	0,0	69,2	29,9	33,0	24,8
1994	62,8	2,8	32,8	1,5	65,7	34,3	37,1	29,7
1995	56,9	2,6	36,7	3,8	59,5	40,5	43,1	36,2
1996	53,1	2,4	39,4	5,1	55,5	44,5	46,9	38,3
1997	48,1	2,4	44,0	5,5	50,5	49,5	51,9	43,1
1998	44,7	1,9	48,0	5,4	46,5	53,5	55,3	50,4
1999	41,7	1,6	52,3	4,4	43,3	56,7	58,3	57,7
2000	38,6	2,5	55,8	3,1	41,1	58,9	61,4	41,7
2001	37,5	3,0	56,7	2,8	40,5	59,5	62,5	46,6

SCP = single chamber pacing devices, DCP = dual chamber pacing devices, Physiologic = Physiologic pacing devices (AAI, DDD, VDD), RR = rate variability

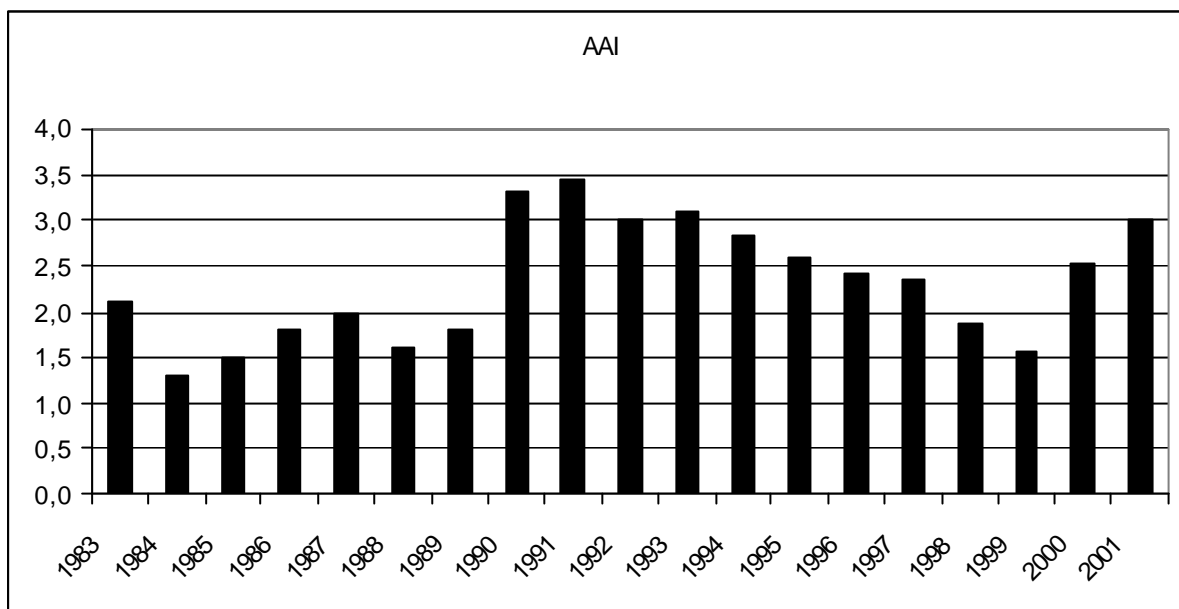
2.3.2. VVI-mode

	Mean	SD	Median	Minimum	Maximum
VVI	68,2	19,3	70,8	37,5	92,6



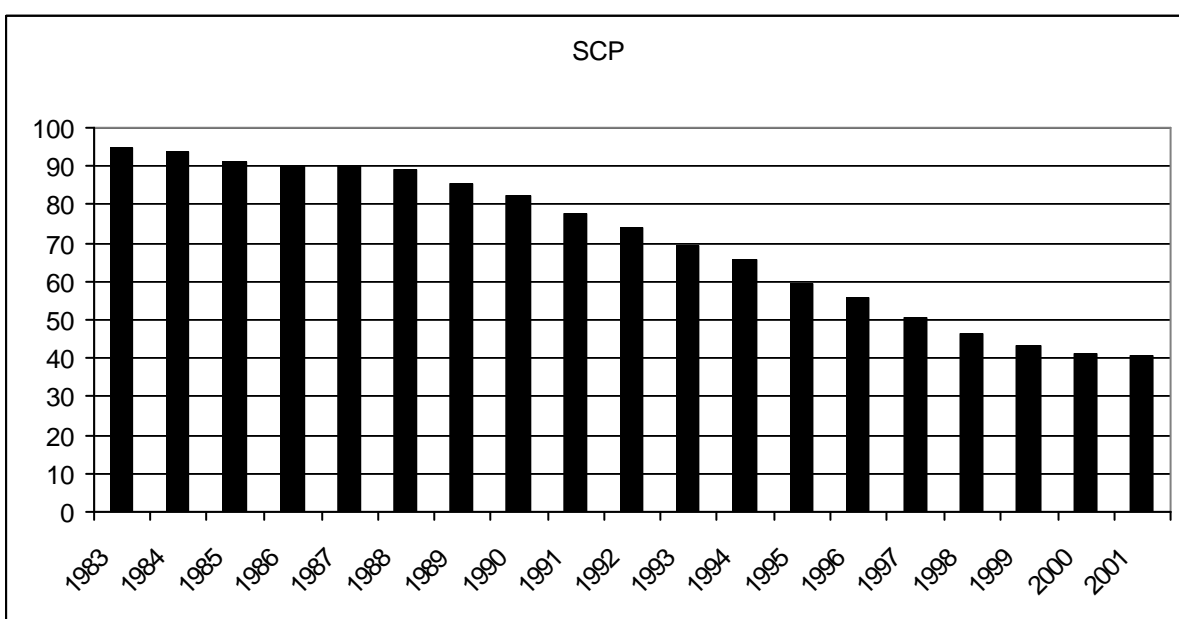
2.3.3. AAI-mode

	Mean	SD	Median	Minimum	Maximum
AAI	2,3	0,6	2,4	1,3	3,5



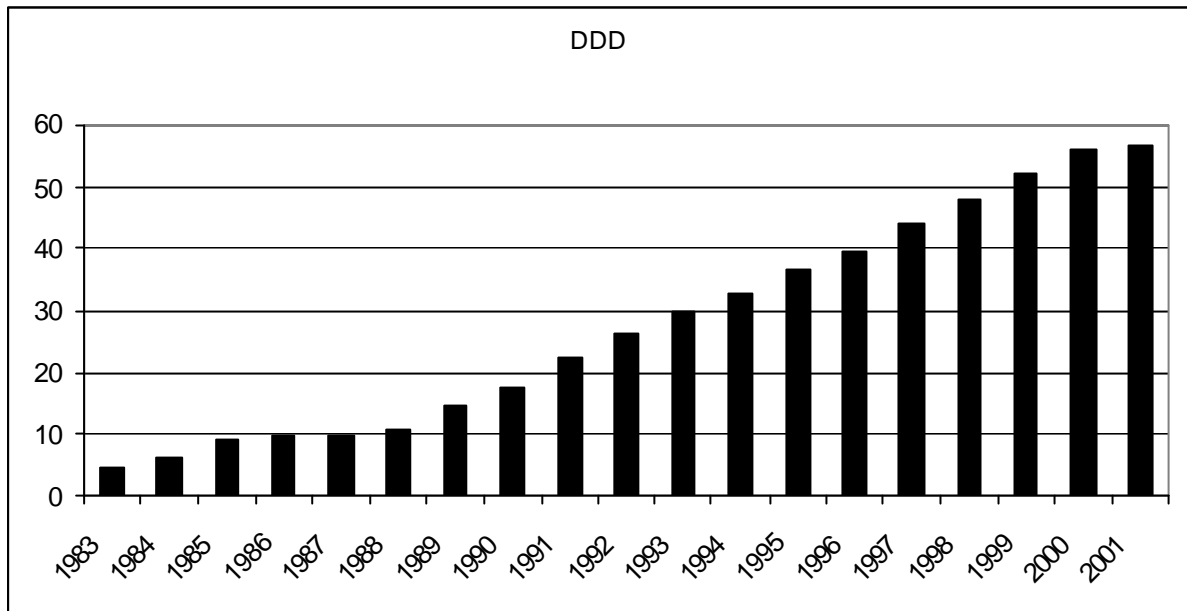
2.3.4. Single chamber pacing (SCP) modes

	Mean	SD	Median	Minimum	Maximum
SCP	70,5	19,1	73,8	94,7	40,5



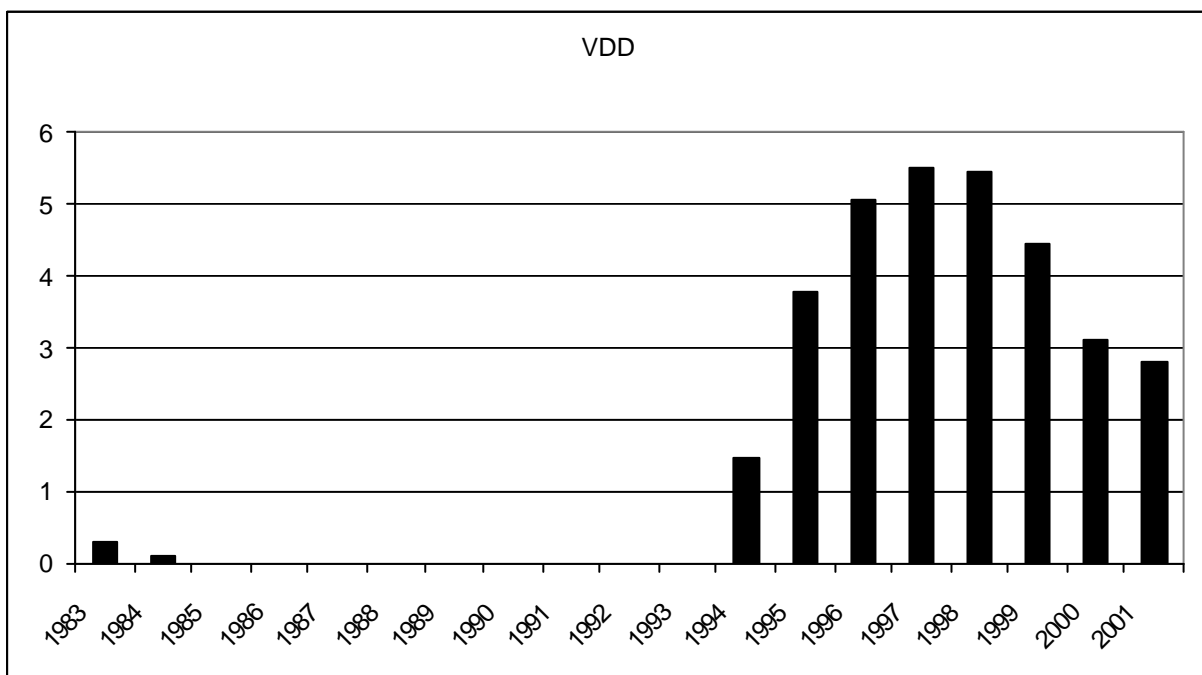
2.3.5. DDD-mode

	Mean	SD	Median	Minimum	Maximum
DDD	27,7	17,4	26,2	4,8	56,7



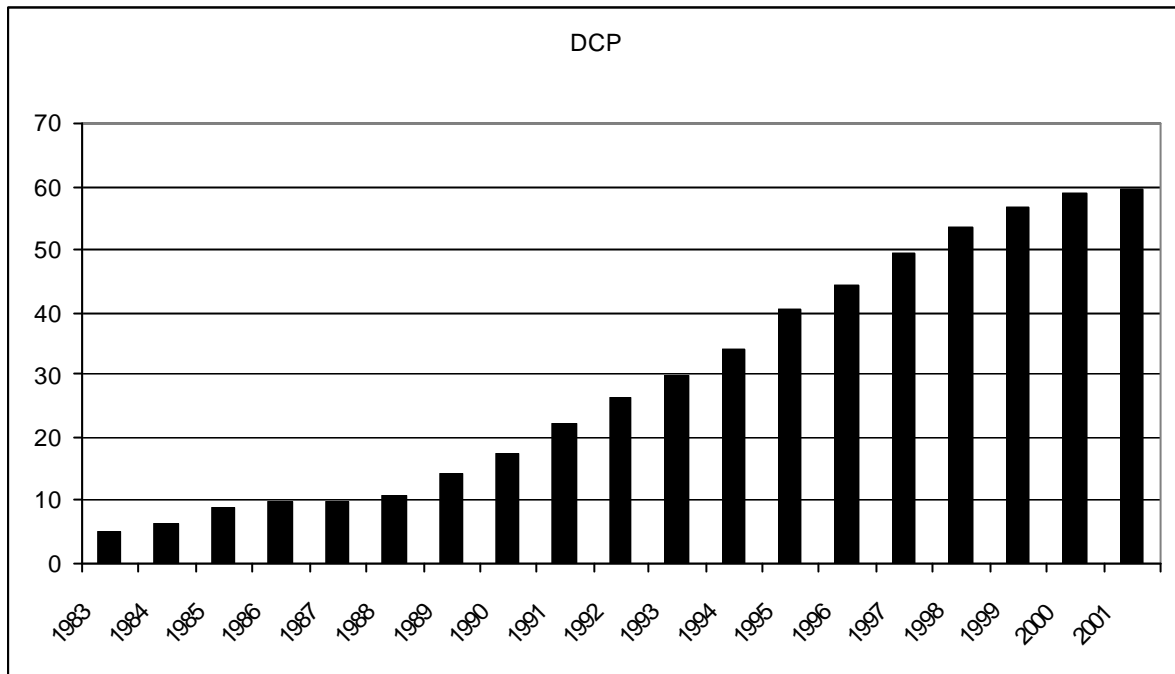
2.3.6. VDD-mode

	Mean	SD	Median	Minimum	Maximum
VDD	1,7	2,1	0,1	0,0	5,5



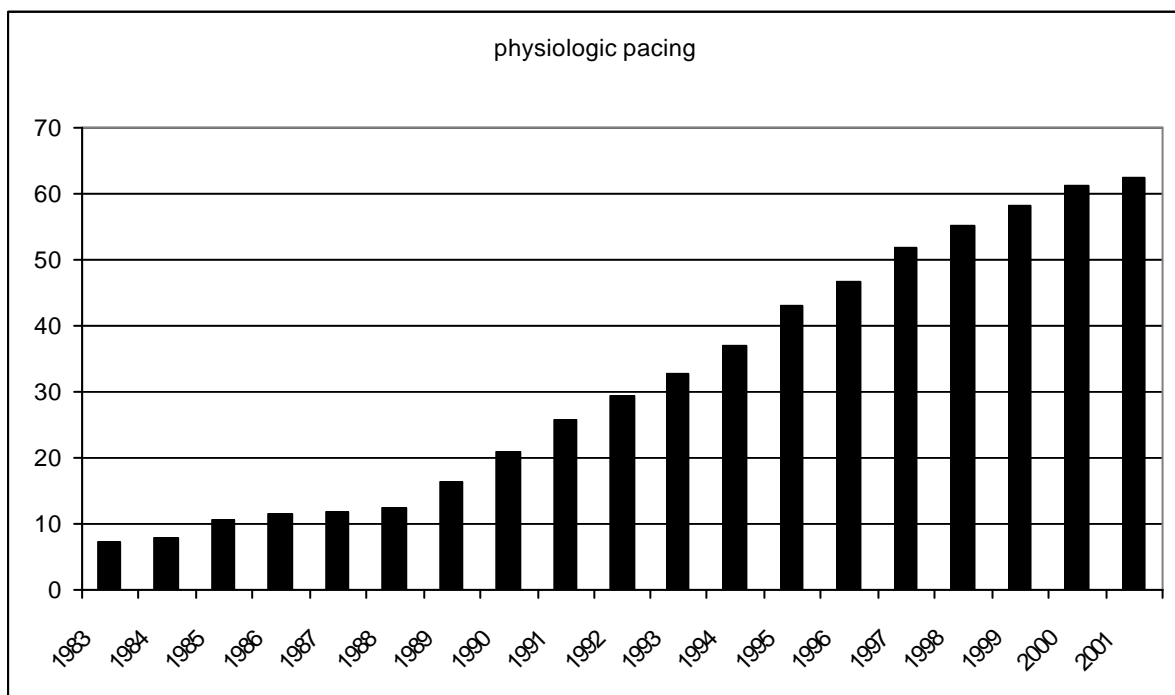
2.3.7. Dual chamber pacing modes

	Mean	SD	Median	Minimum	Maximum
DCP	29,4	19,1	26,2	59,5	5,1



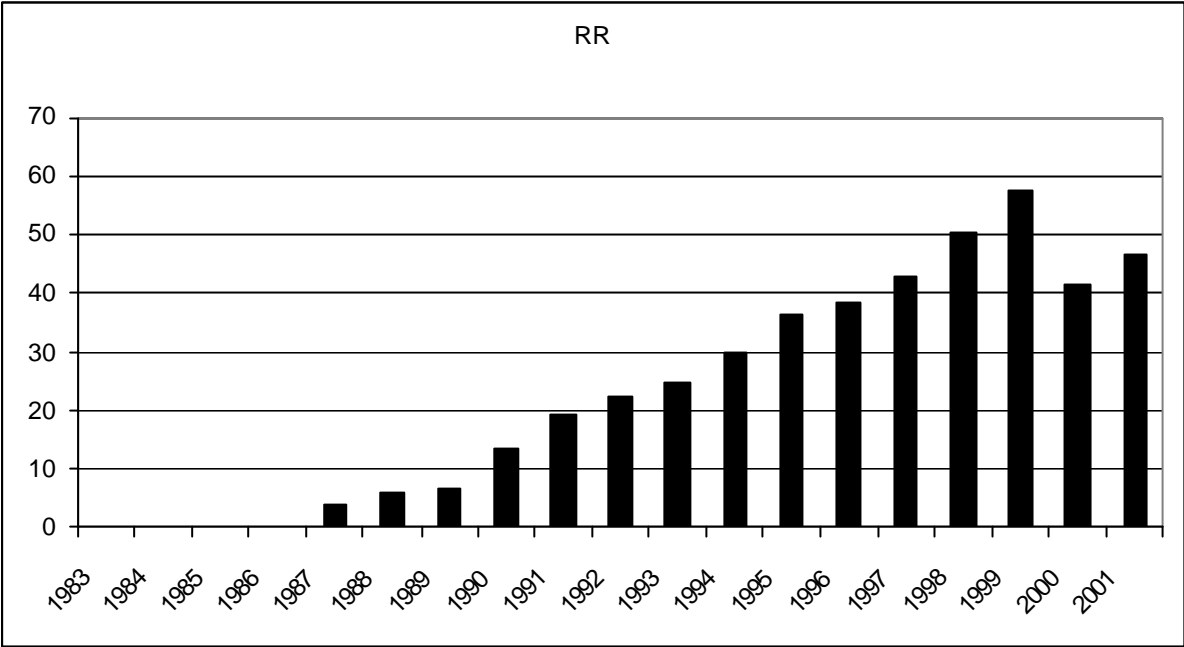
2.3.8. Physiologic pacing modes (AAI, DDD, VDD)

	Mean	SD	Median	Minimum	Maximum
Physiologic	31,7	19,3	29,2	62,5	7,2



2.3.9. Rate variability

	Mean	SD	Median	Minimum	Maximum
RR	23,2	19,0	22,5	0,0	57,7



2.3.10. Mode of pacing according to ECG-Indications

Data are available since 1992. They were divided into old and new states after the reunification of Germany by Irnich and co-workers. Since 2000 we did not continue this practice, because this key event in Germany's history is now more than 10 years ago.

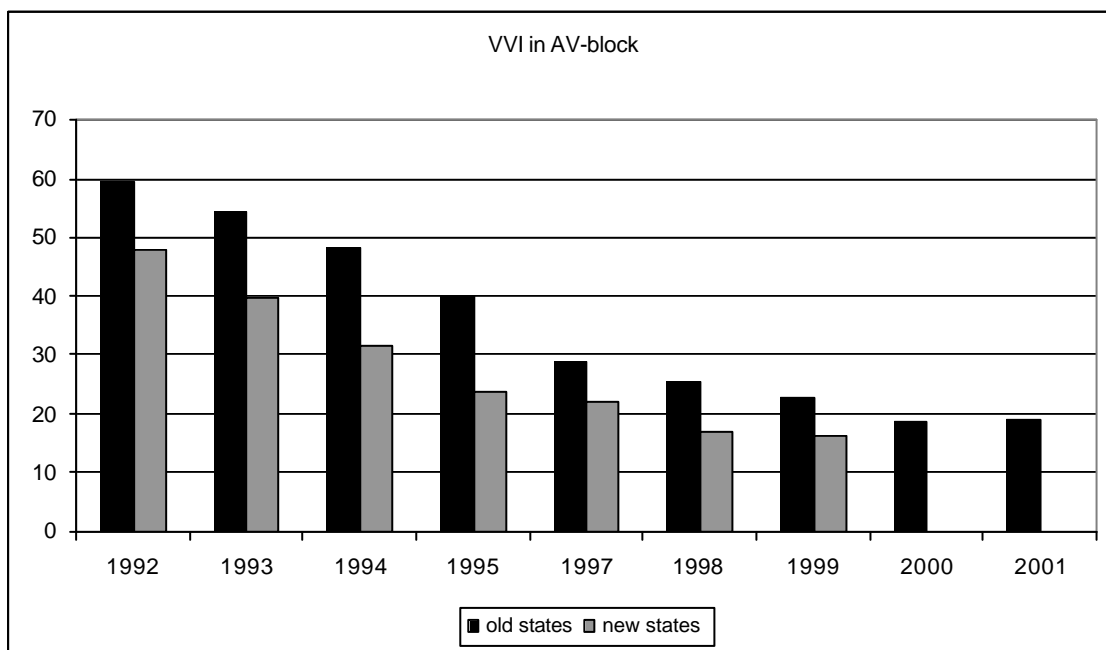
2.3.10.1. AV-block

2.3.10.1.1. Overview

	old states				new states			
	VVI	AAI	DDD	VDD	VVI	AAI	DDD	VDD
1992	59,5	0,2	40,2	0,1	47,7	0,0	52,3	0,0
1993	54,2	0,3	45,1	0,4	39,7	0,2	60,1	0,0
1994	48,2	0,2	47,7	3,9	31,7	0,0	62,6	5,7
1995	40,0	0,2	49,1	10,5	23,9	0,0	62,9	13,2
1997	28,7	0,0	56,8	14,5	22,1	0,0	60,9	17,0
1998	25,3	0,0	60,4	14,3	17,1	0,0	63,8	19,1
1999	22,7	0,0	66,0	11,3	16,0	0,0	69,1	14,9
2000	18,8	0,3	71,2	9,7				
2001	19,1	0,3	71,7	8,8				

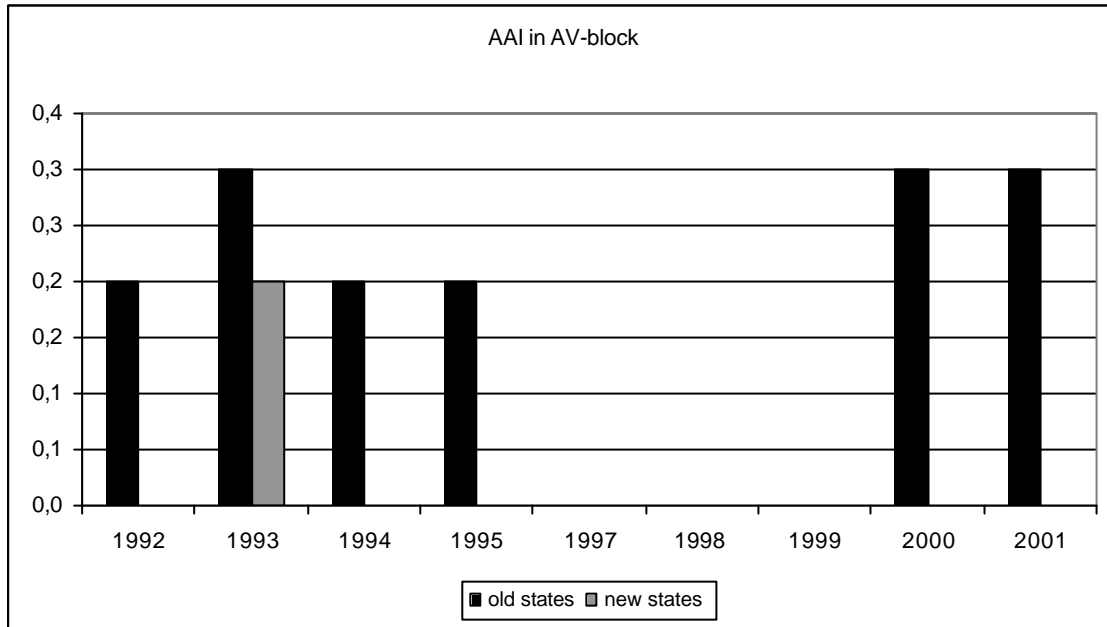
2.3.10.1.2. VVI-mode

VVI	Mean	SD	Median	Minimum	Maximum
old states	35,2	14,8	28,7	18,8	59,5
new states	28,3	11,0	23,9	16,0	47,7



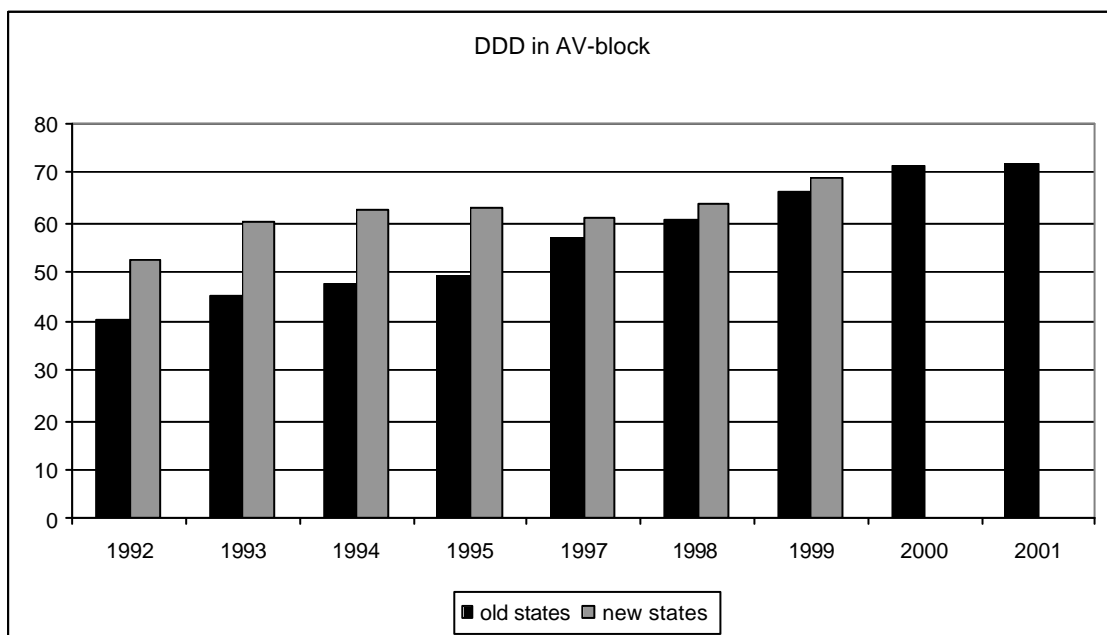
2.3.10.1.3. AAI-mode

AAI	Mean	SD	Median	Minimum	Maximum
old states	0,2	0,1	0,2	0,0	0,3
new states	0,0	0,1	0,0	0,0	0,2



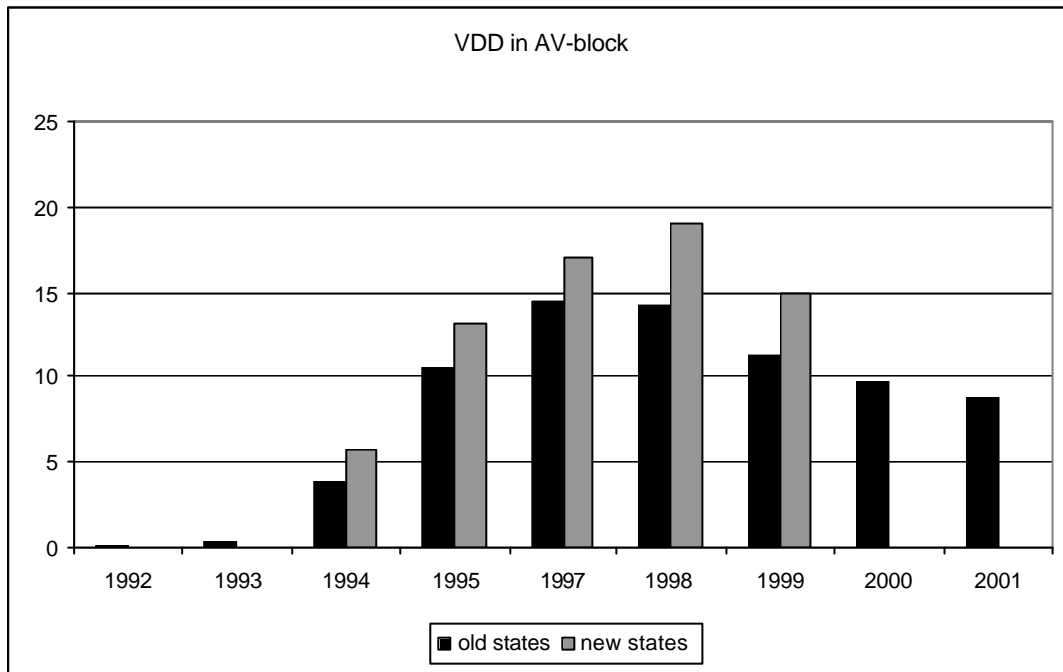
2.3.10.1.4. DDD-mode

DDD	Mean	SD	Median	Minimum	Maximum
old states	56,5	11,0	56,8	40,2	71,7
new states	61,7	4,7	62,6	52,3	69,1



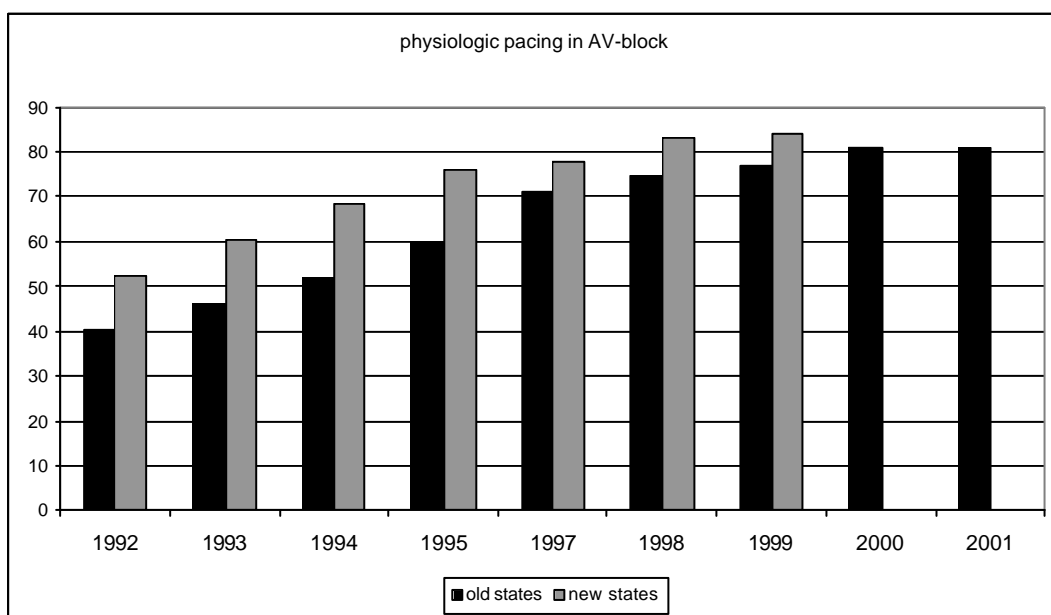
2.3.10.1.5. VDD-mode

VDD	Mean	SD	Median	Minimum	Maximum
old states	8,2	5,2	9,7	0,1	14,5
new states	10,0	7,4	13,2	0,0	19,1



2.3.10.1.6. Physiologic pacing (AAI, DDD, VDD)

Physiologic pacing	Mean	SD	Median	Minimum	Maximum
old states	64,8	14,8	71,3	40,5	81,2
new states	71,7	11,0	76,1	52,3	84,0



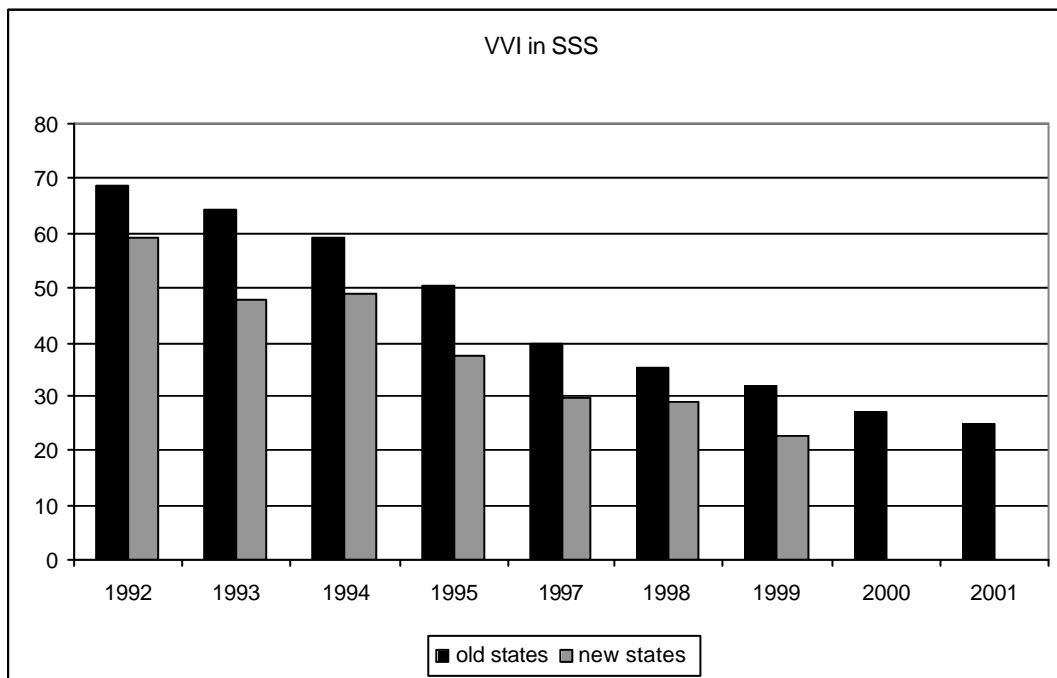
2.3.10.2. Sick sinus syndrome (SSS)

2.3.10.2.1. Overview

	old states				new states			
	VVI	AAI	DDD	VDD	VVI	AAI	DDD	VDD
1992	68,5	8,1	23,5		59,0	2,1	30,2	
1993	64,2	8,8	27,0		48,0	14,8	37,2	
1994	59,1	7,3	32,5	0,1	49,1	11,5	39,2	0,2
1995	50,3	8,0	41,1	0,6	37,6	8,9	53,3	0,2
1997	39,8	6,7	52,5	0,6	29,5	6,8	63,0	0,7
1998	35,6	4,9	58,9	0,6	29,0	7,0	63,6	0,4
1999	31,8	4,0	62,8	0,7	22,6	4,0	72,0	0,4
2000	27,2	4,2	68,1	0,4				
2001	25,0	3,2	71,5	0,3				

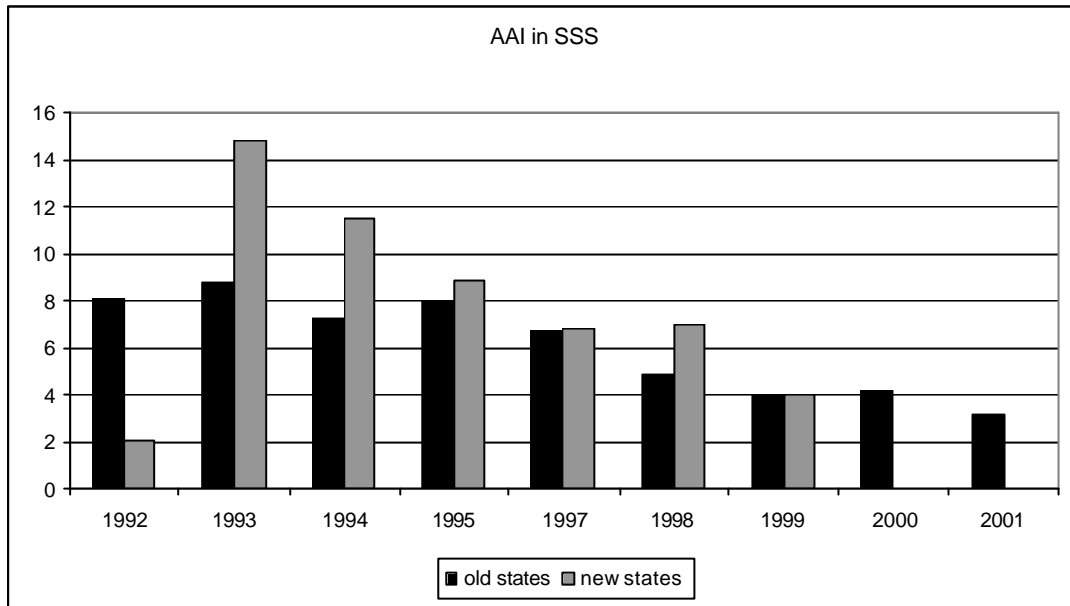
2.3.10.2.2. VVI-mode

VVI	Mean	SD	Median	Minimum	Maximum
old states	44,6	15,5	39,8	25,0	68,5
new states	39,3	12,2	37,6	22,6	59,0



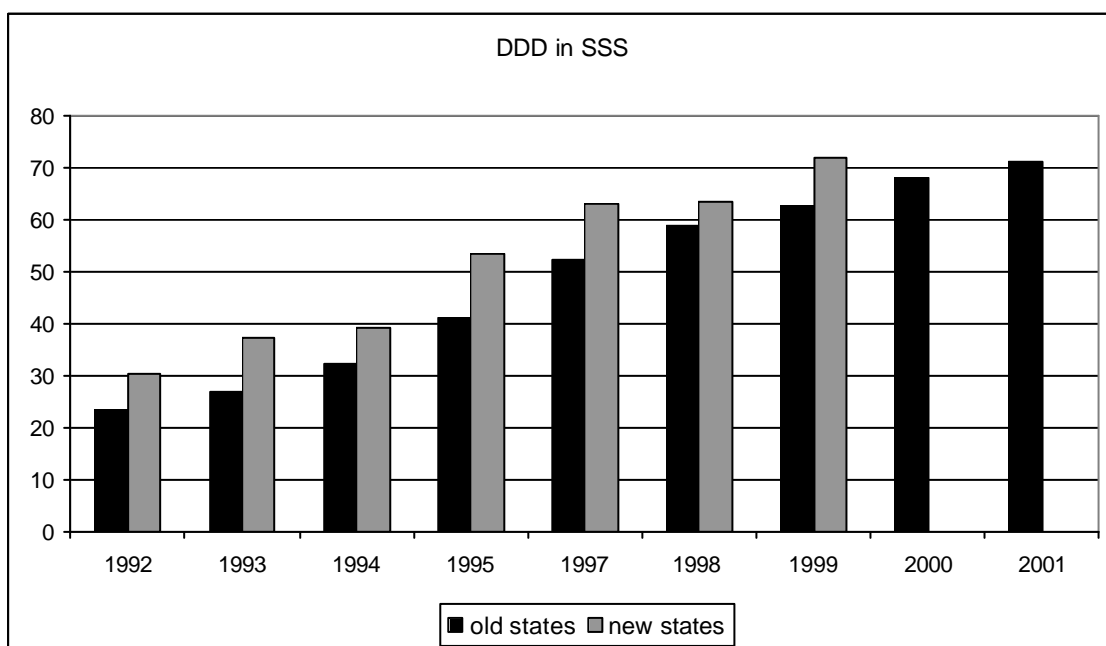
2.3.10.2.3. AAI-mode

AAI	Mean	SD	Median	Minimum	Maximum
old states	6,1	2,0	6,7	3,2	8,8
new states	7,9	4,0	7,0	2,1	14,8



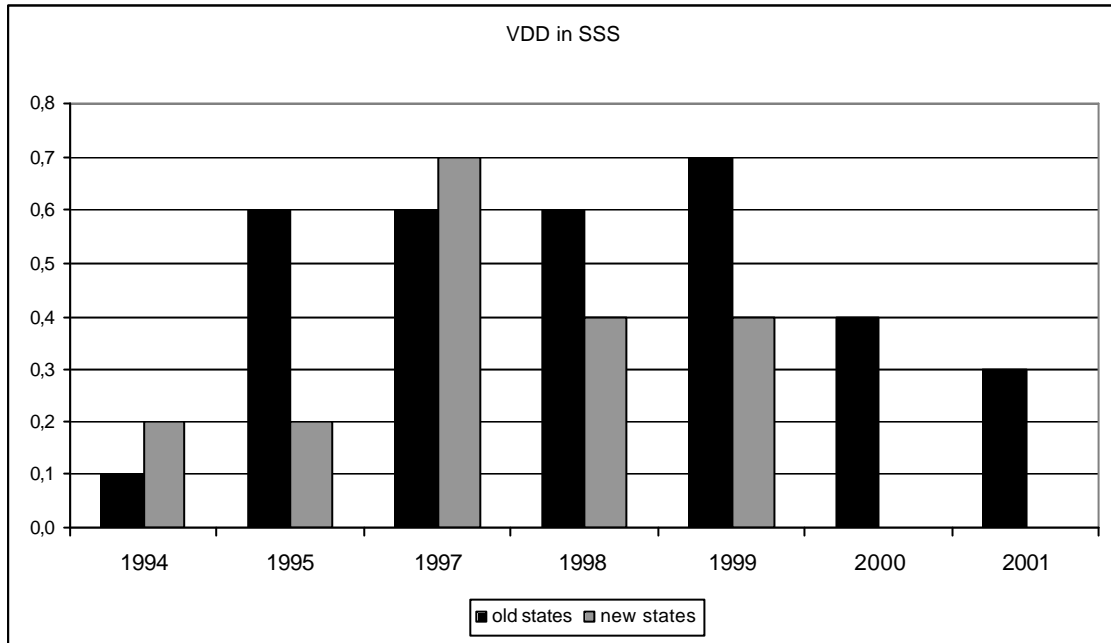
2.3.10.2.4. DDD-mode

DDD	Mean	SD	Median	Minimum	Maximum
old states	48,7	17,1	52,5	23,5	72,0
new states	51,2	14,7	53,3	30,2	72,0



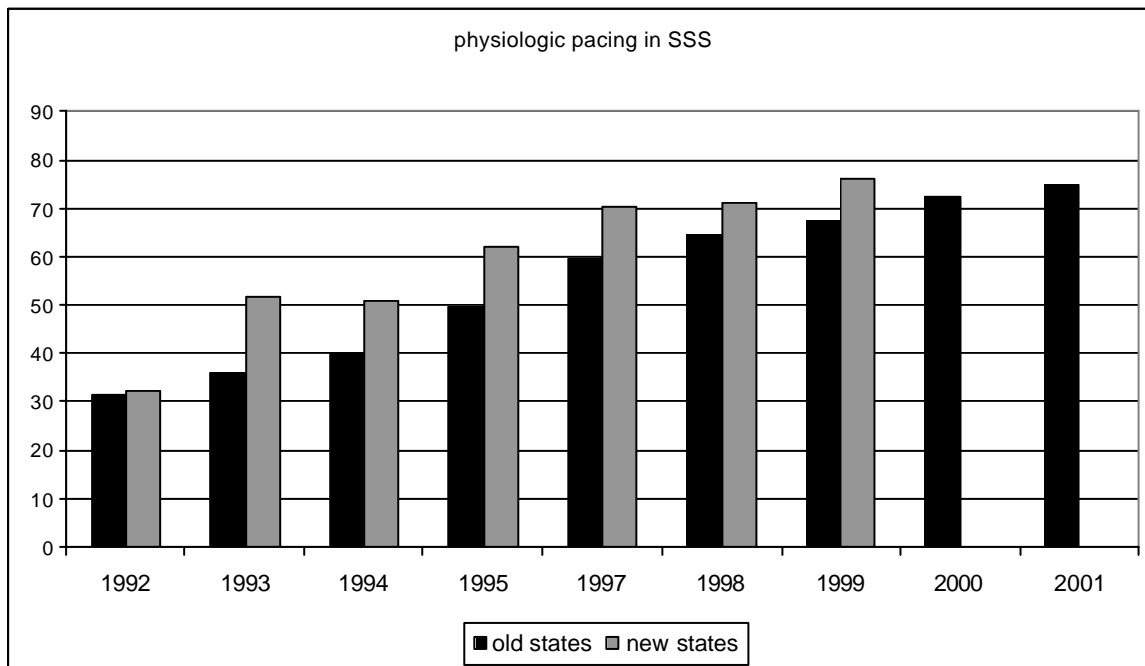
2.3.10.2.5. VDD-mode

VDD	Mean	SD	Median	Minimum	Maximum
old states	0,5	0,2	0,6	0,1	0,7
new states	0,4	0,2	0,4	0,2	0,7



2.3.10.2.6. Physiologic pacing modes (AAI, DDD, VDD)

Physiologic pacing	Mean	SD	Median	Minimum	Maximum
old states	55,2	15,5	59,8	31,6	75,0
new states	59,4	14,2	62,4	32,3	76,4



2.3.10.3. Sick sinus syndrome & AV-block (Binodal disease)

2.3.10.3.1. Overview

SSS+AVB	old states				new states			
	VVI	AAI	DDD	VDD	VVI	AAI	DDD	VDD
1992	47,1	0,0	52,9					
1993	37,1	0,0	62,9		53,1	6,3	40,6	0,0
1994	29,8	0,0	70,2		37,2	0,0	62,8	0,0
1995	25,9	0,0	73,2	0,9	16,7	0,0	80,5	2,8
1997	26,7	1,0	70,3	2,0	100,0	0,0	0,0	0,0
1998	20,5	0,0	78,5	1,0	3,9	3,8	88,5	3,8
1999	22,2	0,0	77,1	0,7	24,4	0,0	75,6	0,0
2000	12,2	0,0	86,5	1,3				
2001	17,9	0,0	81,4	0,6				

		Mean	SD	Median	Minimum	Maximum
VVI	old states	26,6	9,9	25,9	12,2	47,1
	new states	33,6	32,0	24,4	1,4	100,0
AAI	old states	0,1	0,3	0,0	0,0	1,0
	new states	1,4	2,4	0,0	0	6,3
DDD	old states	72,6	9,5	73,2	52,9	86,5
	new states	49,7	34,5	62,8	0	88,5
VDD	old states	1,1	0,5	1,0	0,6	2,0
	new states	0,9	1,5	0,0	0	63,8

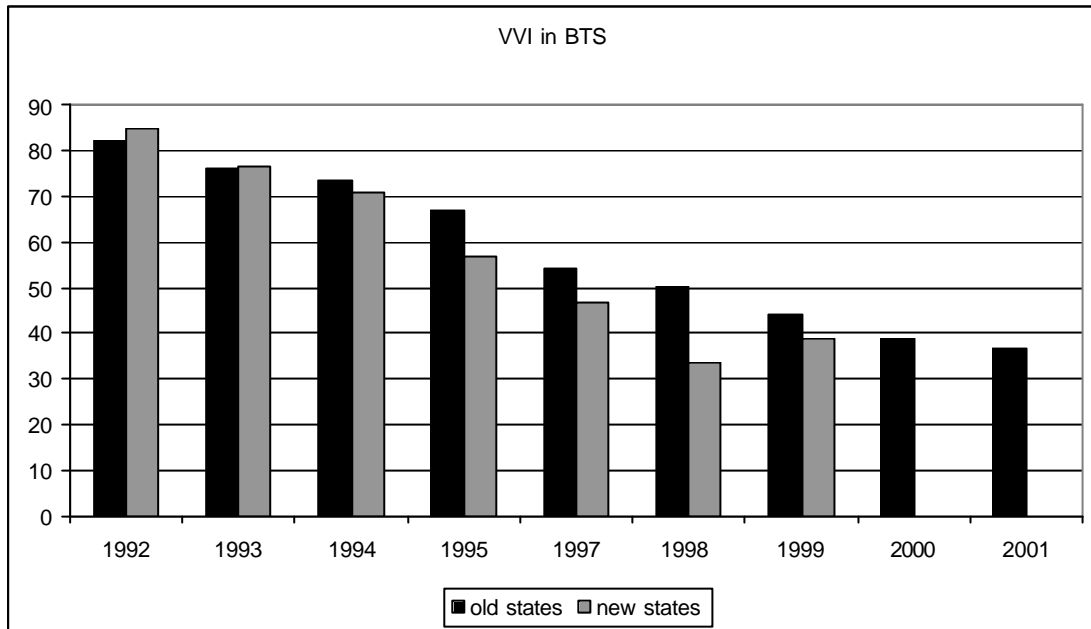
2.3.10.4. Bradycardia/tachycardia-syndrome

2.3.10.4.1. Overview

BTS	old states				new states			
	VVI	AAI	DDD	VDD	VVI	AAI	DDD	VDD
1992	82,3	3,1	14,6		84,8	2,1	13,1	
1993	76,1	3,8	20,1		76,6	3,0	20,4	
1994	73,6	2,2	24,1	0,1	71,0	2,5	26,1	0,4
1995	66,8	2,7	29,8	0,7	56,9	1,3	41,8	0,0
1997	54,4	1,9	43,1	0,6	46,9	0,8	51,9	0,4
1998	50,2	1,2	48,2	0,4	33,3	4,7	61,6	0,4
1999	44,2	1,5	53,8	0,5	38,6	3,1	58,3	0,0
2000	38,6	1,0	60,0	0,4				
2001	37,0	1,1	61,6	0,3				

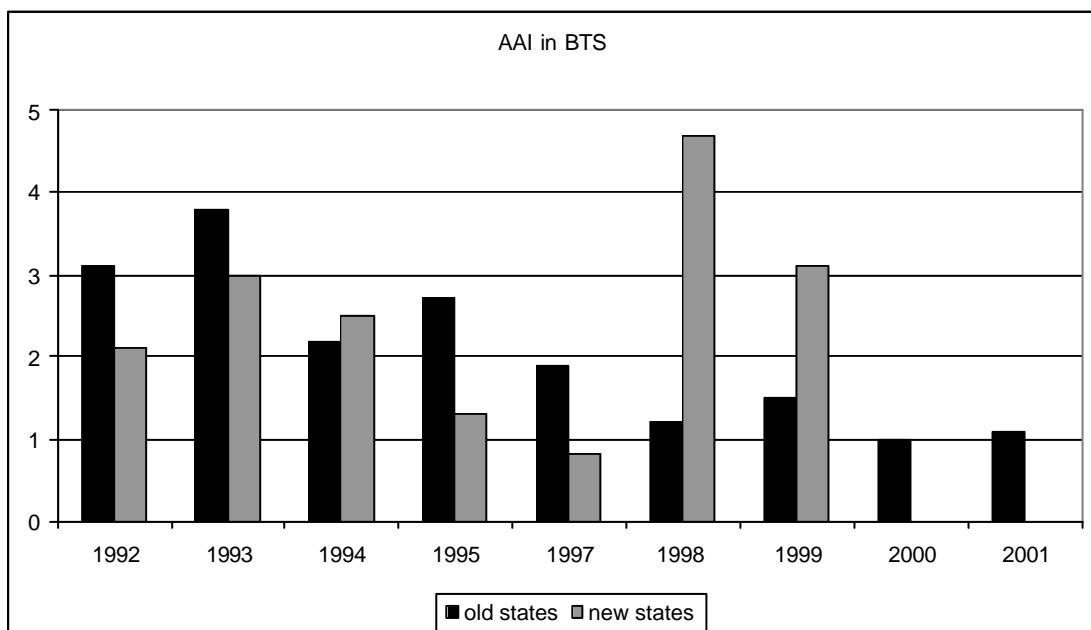
2.3.10.4.2. VVI-mode

VVI	Mean	SD	Median	Minimum	Maximum
old states	58,1	16,1	54,4	37,0	82,3
new states	58,3	18,3	56,9	33,3	84,8



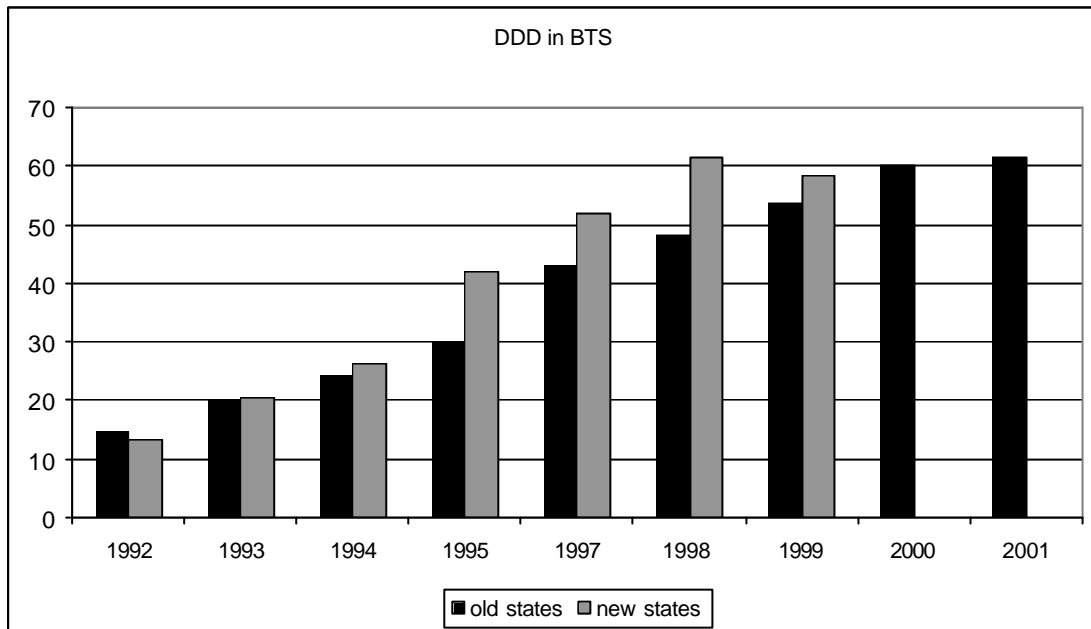
2.3.10.4.3. AAI-mode

AAI	Mean	SD	Median	Minimum	Maximum
old states	2,1	0,9	1,9	1,0	3,8
new states	2,5	1,2	2,5	0,8	4,7



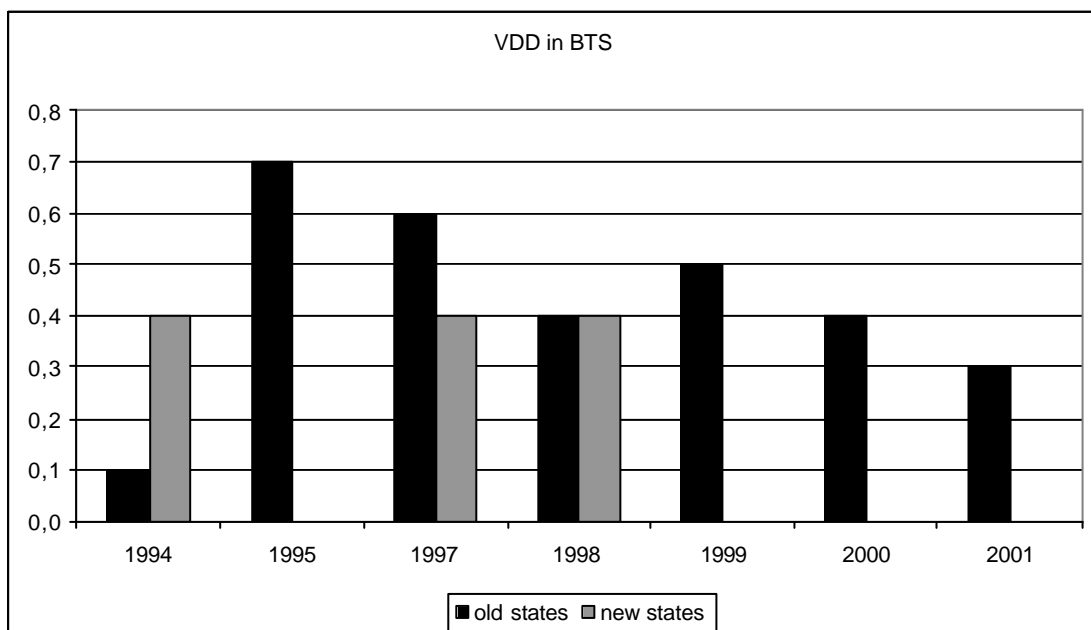
2.3.10.4.4. DDD-mode

DDD	Mean	SD	Median	Minimum	Maximum
old states	39,5	16,8	43,1	14,6	61,6
new states	39,0	17,9	41,8	13,1	61,6



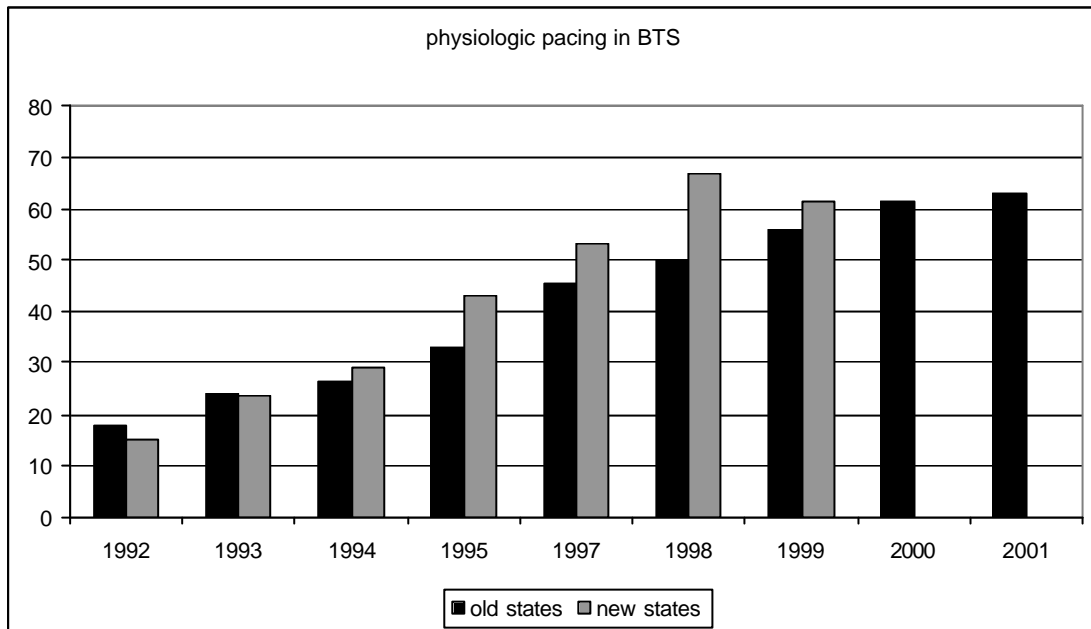
2.3.10.4.5. VDD-mode

VDD	Mean	SD	Median	Minimum	Maximum
old states	0,4	0,2	0,4	0,1	0,7
new states	0,2	0,2	0,4	0,0	0,4



2.3.10.4.6. Physiologic pacing modes (AAI, DDD, VDD)

Physiologic pacing	Mean	SD	Median	Minimum	Maximum
old states	41,9	16,1	45,6	17,7	63
new states	41,7	18,3	43,1	15,2	66,7



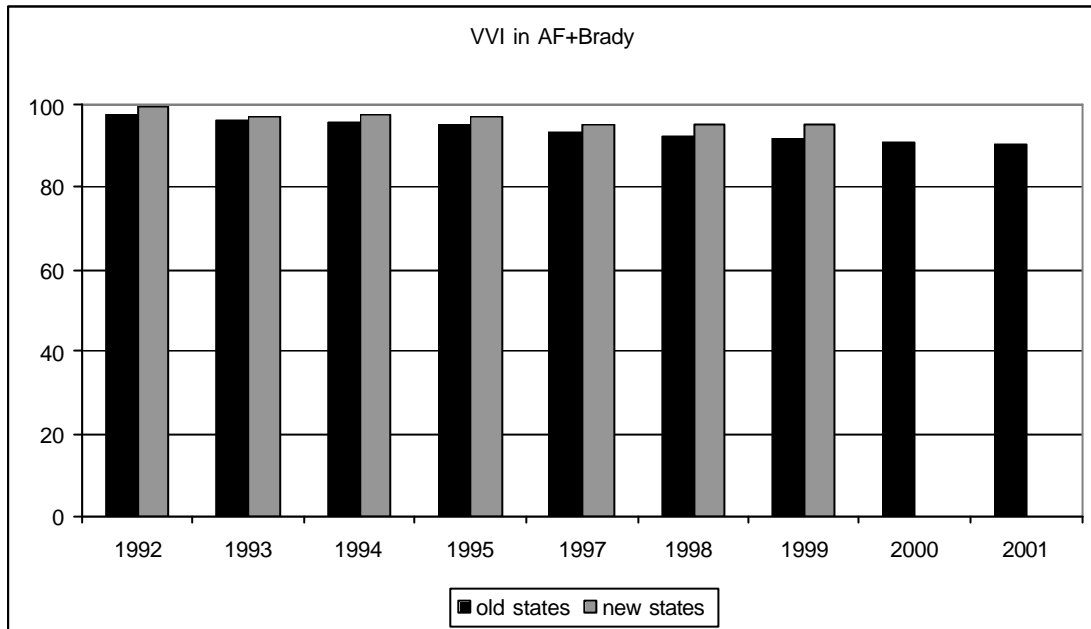
2.3.10.5. Atrial flutter/fibrillation + bradycardia

2.3.10.5.1. Overview

AF+Brady	old states				new states			
	VVI	AAI	DDD	VDD	VVI	AAI	DDD	VDD
1992	97,5	0,4	2,1		99,7	0,0	0,3	
1993	96,3	0,4	3,3		97,3	0,8	1,9	
1994	95,8	0,6	3,5	0,1	97,6	0,2	2,0	0,2
1995	95,1	0,2	4,5	0,2	97,1	0,0	2,7	0,2
1997	93,5	0,3	5,8	0,4	95,2	0,0	4,6	0,2
1998	92,6	0,3	6,8	0,3	95,5	0,0	4,5	0,0
1999	91,8	0,9	7,0	0,3	95,4	0,2	4,0	0,0
2000	90,9	0,4	8,5	0,2				
2001	90,4	0,7	8,5	0,4				

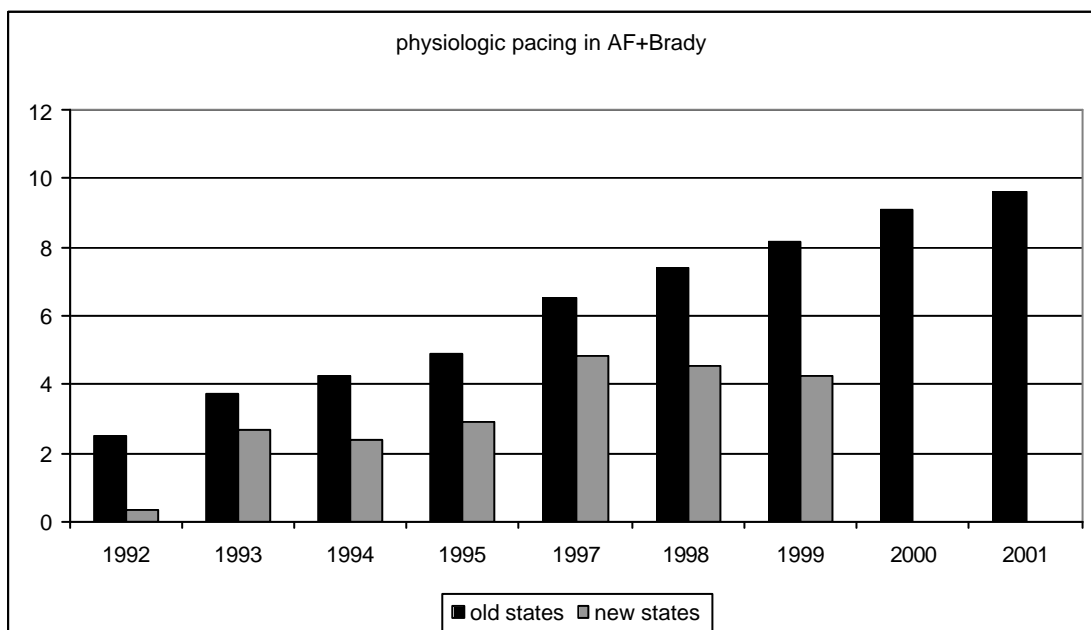
2.3.10.5.2. VVI-mode

VVI	Mean	SD	Median	Minimum	Maximum
old states	93,8	2,4	93,5	90,4	97,5
new states	96,8	1,5	97,1	95,2	99,7



2.3.10.5.3 Physiologic pacing modes (AAI, DDD, VDD)

Physiologic pacing	Mean	SD	Median	Minimum	Maximum
old states	6,2	2,4	6,5	2,5	9,6
new states	3,1	1,4	2,9	0,3	4,8



2.4. Lead polarity

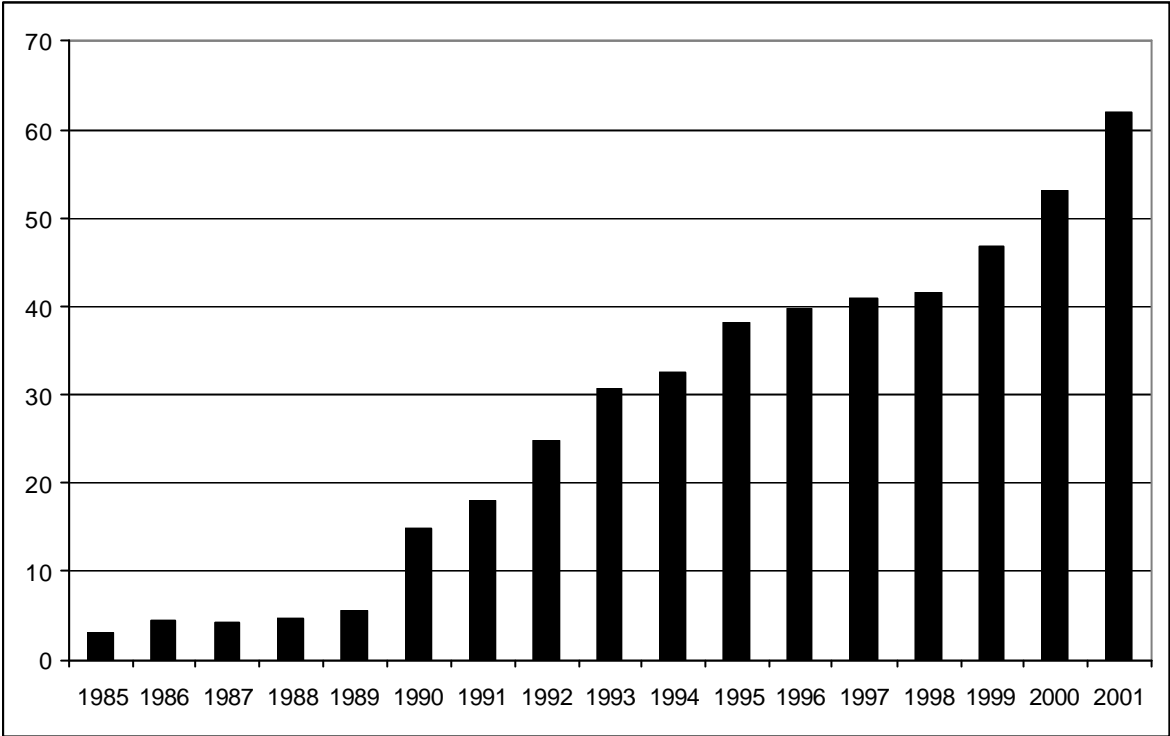
Data are available for ventricular leads since 1985 and for atrial leads since 1991.

2.4.1. Overview

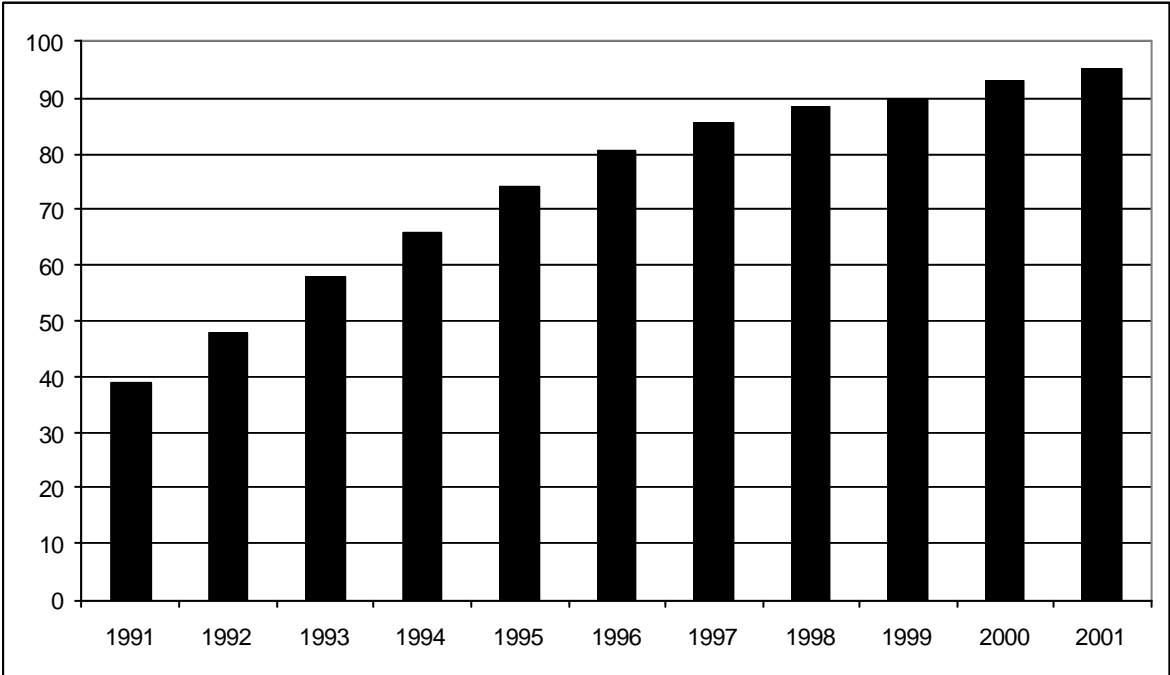
	Ventricle		Atrium	
	unipolar	bipolar	unipolar	bipolar
1985	96,9	3,1		
1986	95,5	4,5		
1987	95,7	4,3		
1988	95,2	4,8		
1989	94,4	5,6		
1990	85,0	15,0		
1991	81,9	18,1	61,2	38,8
1992	75,3	24,7	52,4	47,6
1993	69,3	30,7	42,1	57,9
1994	67,5	32,6	34,0	66,0
1995	61,9	38,1	26,0	74,0
1996	60,3	39,7	19,5	80,5
1997	59,1	40,9	14,7	85,3
1998	58,6	41,5	11,7	88,3
1999	53,3	46,8	10,4	89,6
2000	46,9	53,1	7,2	92,8
2001	38,0	62,0	4,9	95,1

		Mean	SD	Median	Minimum	Maximum
Ventricle	unipolar	72,6	18,5	69,3	38,0	96,9
	bipolar	27,4	18,5	30,7	3,1	62,0
Atrium	unipolar	25,8	18,3	19,5	4,9	61,2
	bipolar	74,2	18,3	80,5	38,8	95,1

2.4.2. Bipolar leads (ventricle)



2.4.3. Bipolar leads (atrium)



3. REPLACEMENTS/EXPLANTATIONS

3.1. Indications for replacement/explantation

3.1.1. Overview

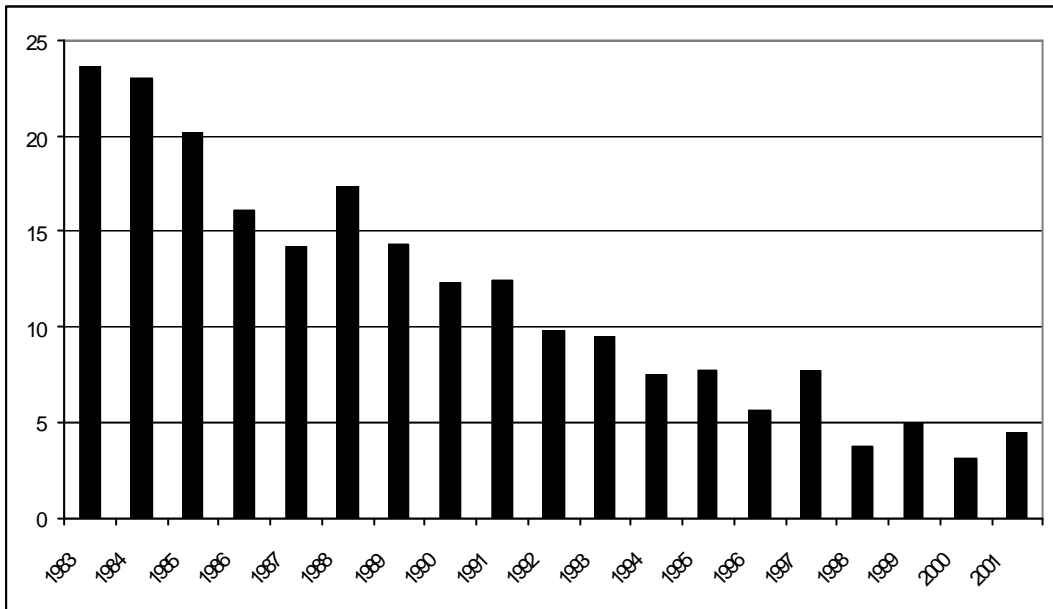
Indications for replacements/explantations (%)							life-time (years)
	unspecified (A1,A2)	elective (B1-B6)	complications (B7,B8,C1-C4)	PG failure (D1,D4,E1-E7)	sensing-problems (D2,D3)	battery depletion (F1,F2)	
1983	11,7	13,3	23,6	13,2	2,2	36,0	
1984	15,2	16,2	23,0	10,0	1,8	33,8	
1985	31,4	7,4	20,1	7,3	3,7	30,1	
1986	28,2	12,8	16,1	8,0	2,7	32,2	
1987	19,4	17,6	14,2	7,0	2,2	39,6	
1988	14,7	15,5	17,3	8,4	2,8	41,3	
1989	15,1	17,8	14,3	6,7	2,3	43,8	
1990	13,3	17,5	12,3	4,7	2,0	50,2	
1991	9,1	21,9	12,5	6,9	3,4	46,2	
1992	10,7	15,9	9,8	7,0	1,6	55,1	8,7
1993	8,7	17,3	9,5	6,9	1,9	55,7	9,0
1994	11,0	17,6	7,6	6,4	1,4	58,8	9,1
1995	10,2	17,1	7,7	3,7	1,3	63,3	9,1
1996	14,2	14,8	5,7	3,3	0,7	64,3	9,3
1997	6,7	13,2	7,7	2,4	0,7	69,3	9,4
1998	9,2	12,6	3,7	1,9	0,6	70,7	9,7
1999	6,4	11,3	4,9	2,9	0,7	73,7	9,9
2000	13,0	8,9	3,2	2,5	0,6	71,7	8,5
2001	9,6	8,7	4,4	2,3	0,5	74,4	8,5

Indications for replacement/explantation	Mean	SD	Median	Minimum	Maximum
unspecified (A1,A2)	13,6	6,4	11,7	6,4	31,4
elective (B1-B6)	14,6	3,6	15,5	7,4	21,9
complications (B7,B8,C1-C4)	11,5	6,2	9,8	3,2	23,6
pulse generator failure (D1,D4,E1-E7)	5,9	2,9	6,7	1,9	13,2
sensing-problems (D2,D3)	1,7	1,0	1,8	0,5	3,7
battery depletion (F1,F2)	53,2	14,8	55,1	30,1	74,4
life-time (years)	9,1	0,5	9,1	8,5	9,9

3.1.2. Complications (B7, B8, C1-C4)

(B7=myopotential inhibition, B8=extracardiac stimulation, C1=penetration, C2=erosion, C3=infection, C4=woundpain)

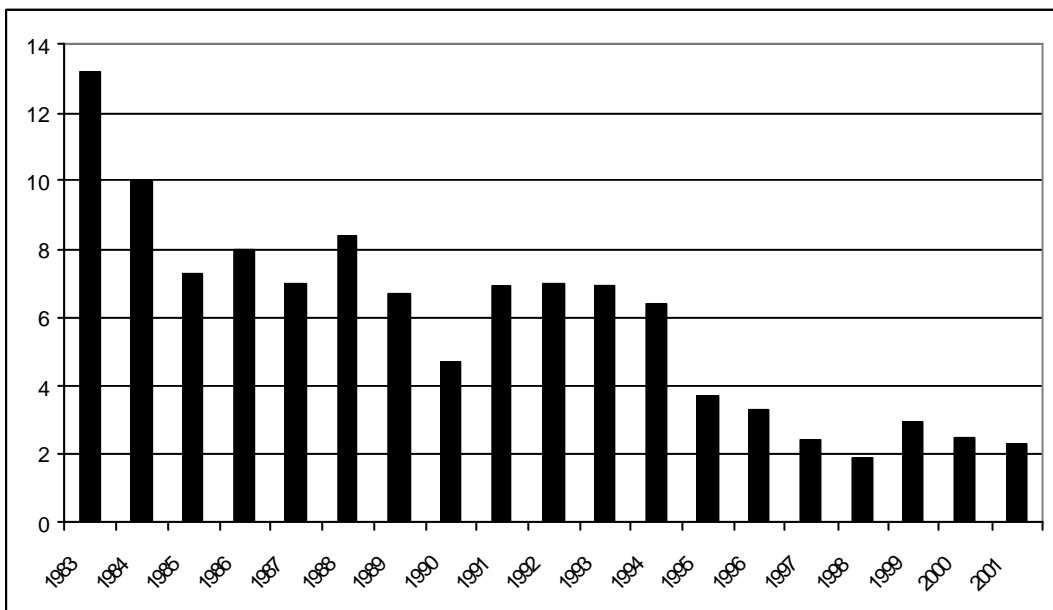
	Mean	SD	Median	Minimum	Maximum
Complications (B7,B8,C1-C4)	11,5	6,2	9,8	3,2	23,6



3.1.3. Pulse generator failure (D1, D4, E1-E7)

(D1=unspecified, D4=magnetic switch, E1=unspecified, E2=no output, E3=low output, E4=slow rate, E5=fast rate, E6= connector, E7=encapsulation)

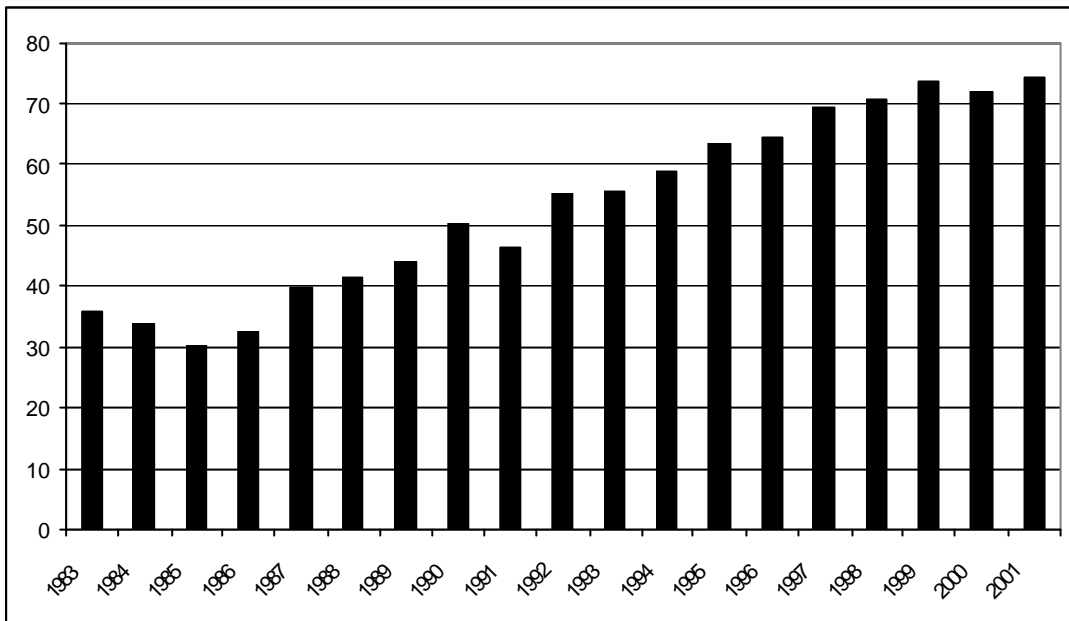
	Mean	SD	Median	Minimum	Maximum
Pulse generator failure (D1,D4,E1-E7)	5,9	2,9	6,7	1,9	13,2



3.1.4. Battery depletion

(F1=normal battery depletion, F2= premature battery depletion)

	Mean	SD	Median	Minimum	Maximum
battery depletion (F1,F2)	53,2	14,8	55,1	30,1	74,4



3.1.5. Pulse generators' life time (years)

	Mean	SD	Median	Minimum	Maximum
life-time (years)	9,1	0,5	9,1	8,5	9,9

