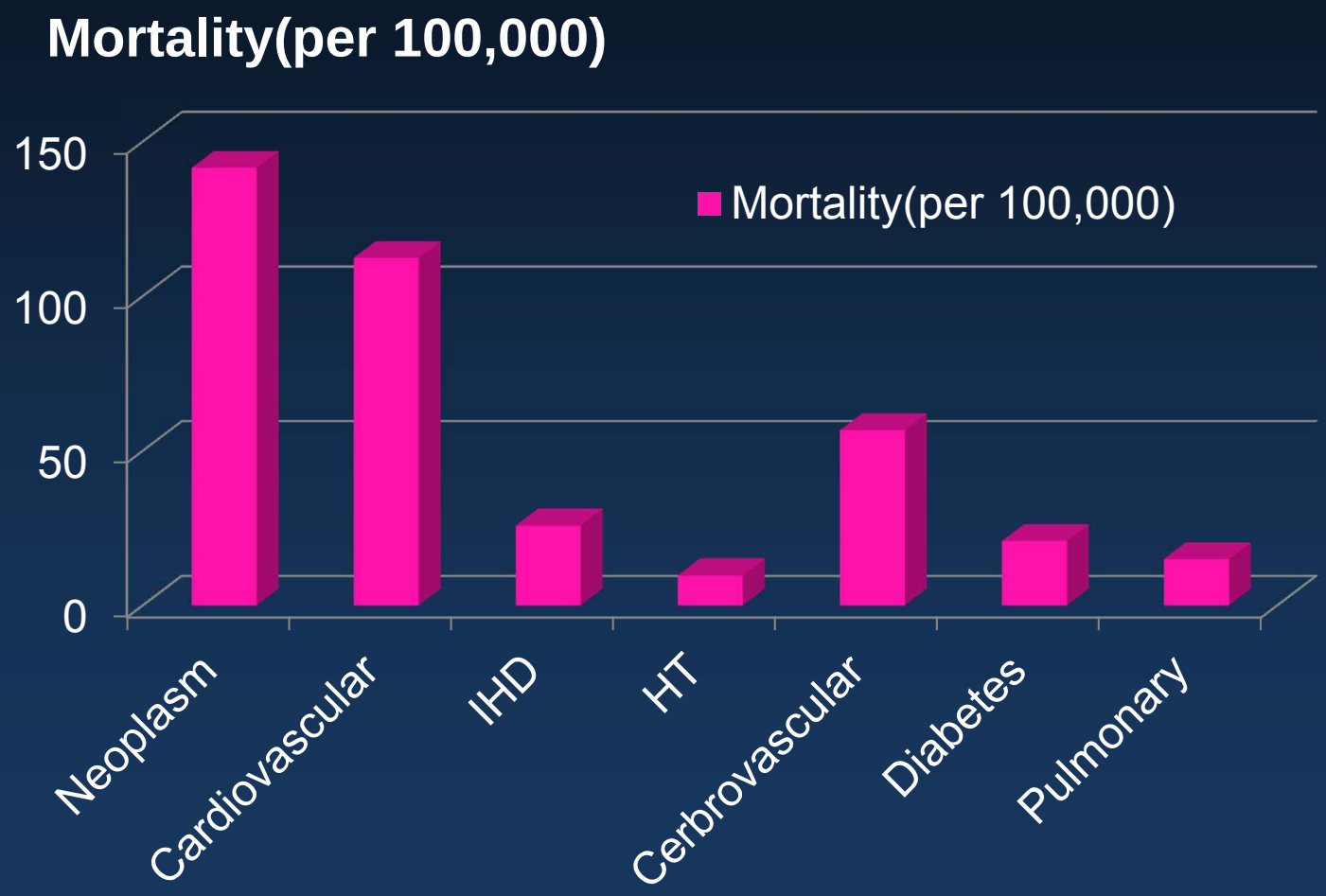
Insight from Heart Failure Registry in Korea

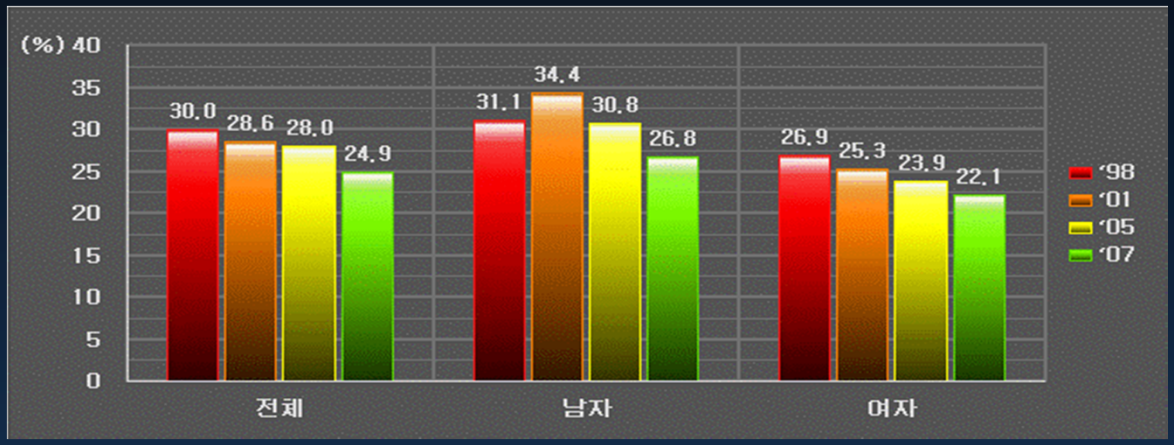
Dong-Ju Choi, MD, PhD
Seoul National University Bundang Hospital
Cardiovascular Center



Data from Statistics, Korea, 2009

Prevalence of disease in Korea

Hypertension



Diabetes

Data from KNHANS, 1998 ~ 2007

국민건강영양조사

Registry Data in Korean from Heart Failure Study Group of KSC

1. Phase 1: Admitted HF (1998-2003)
2. Phase 2: KorHF (2006.6-2009.11)

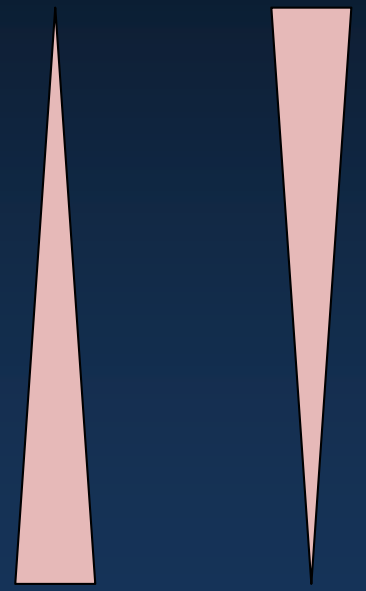
Why do we need Registry ?
-Different people in different studies-

Population studies — **Epidemiology**

Cohorts
Registries
Survey

} **Observational Studies**

Clinical trials — **Selected patients**



Strict **Real word**

Why do we need Registry ?
-Differences between RCT and real world-

Variable	RCT	Community
Mean age	60-65	70-75
Gender M:F	4:1	1:1
FE >40%	excluded	~50%
Atrial fibrillation	15-20%	30-40%
Renal dysfunction	excluded	20-30%
Comorbidities	excluded	Frequent
Drug prescription	optimized	Suboptimal
Drug dosage	At target	Low
Compliance	high	Low
Treatment duration	1-3 years	Life long
3 year mortality	9-19%	25-30%

Adhere®

Acute Decompensated Heart Failure National Registry

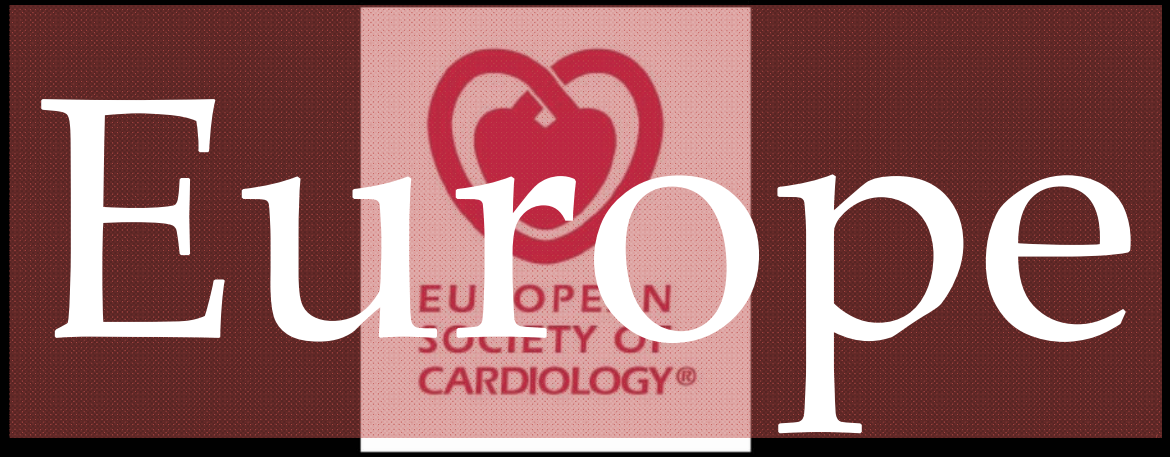
Q1 2006
Final Cumulative National Benchmark Report

USA

Core Module

Adhere: Focused on Improving the Continuum of Care

Sponsored by scios



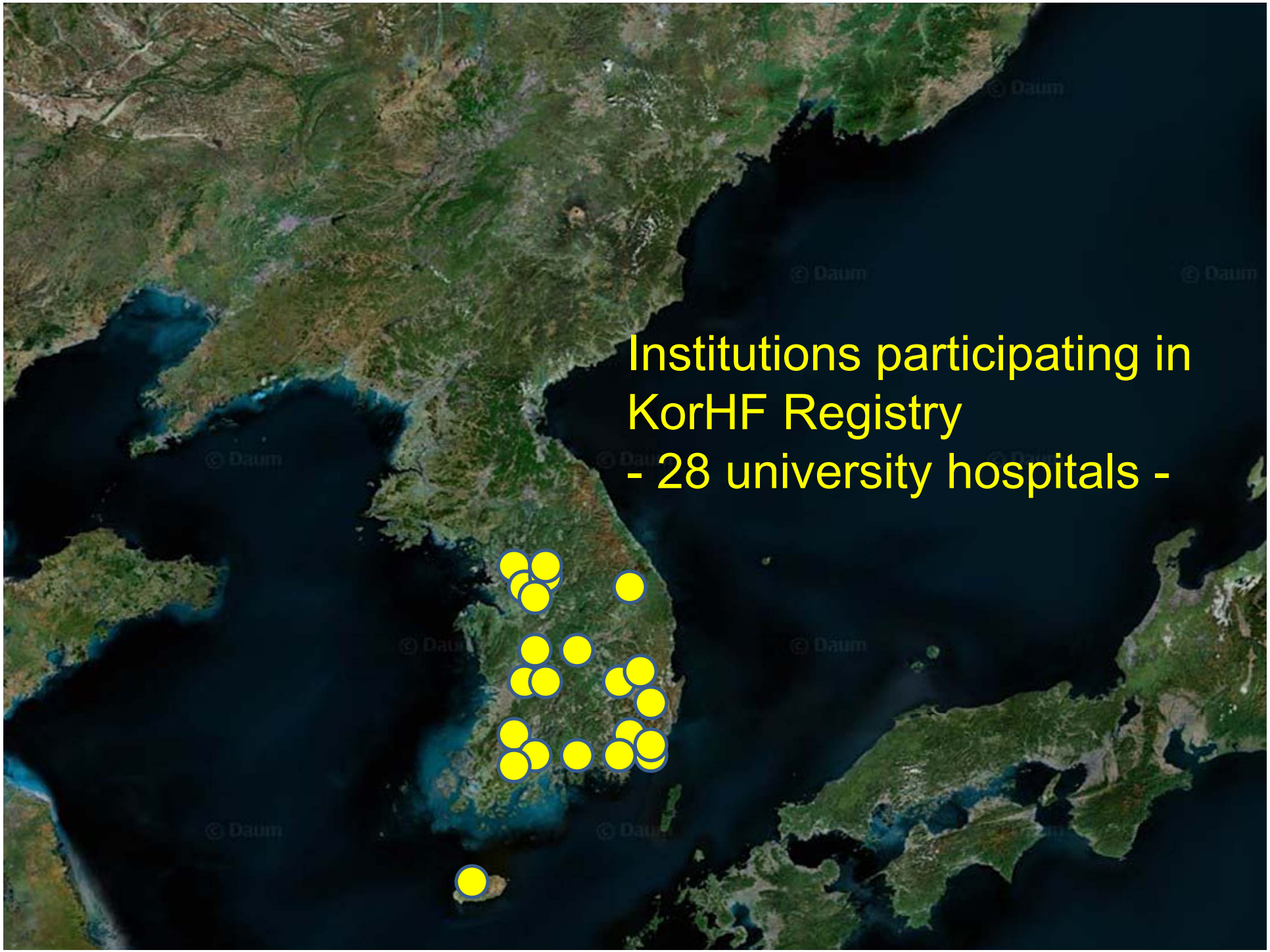
Euro Heart Survey

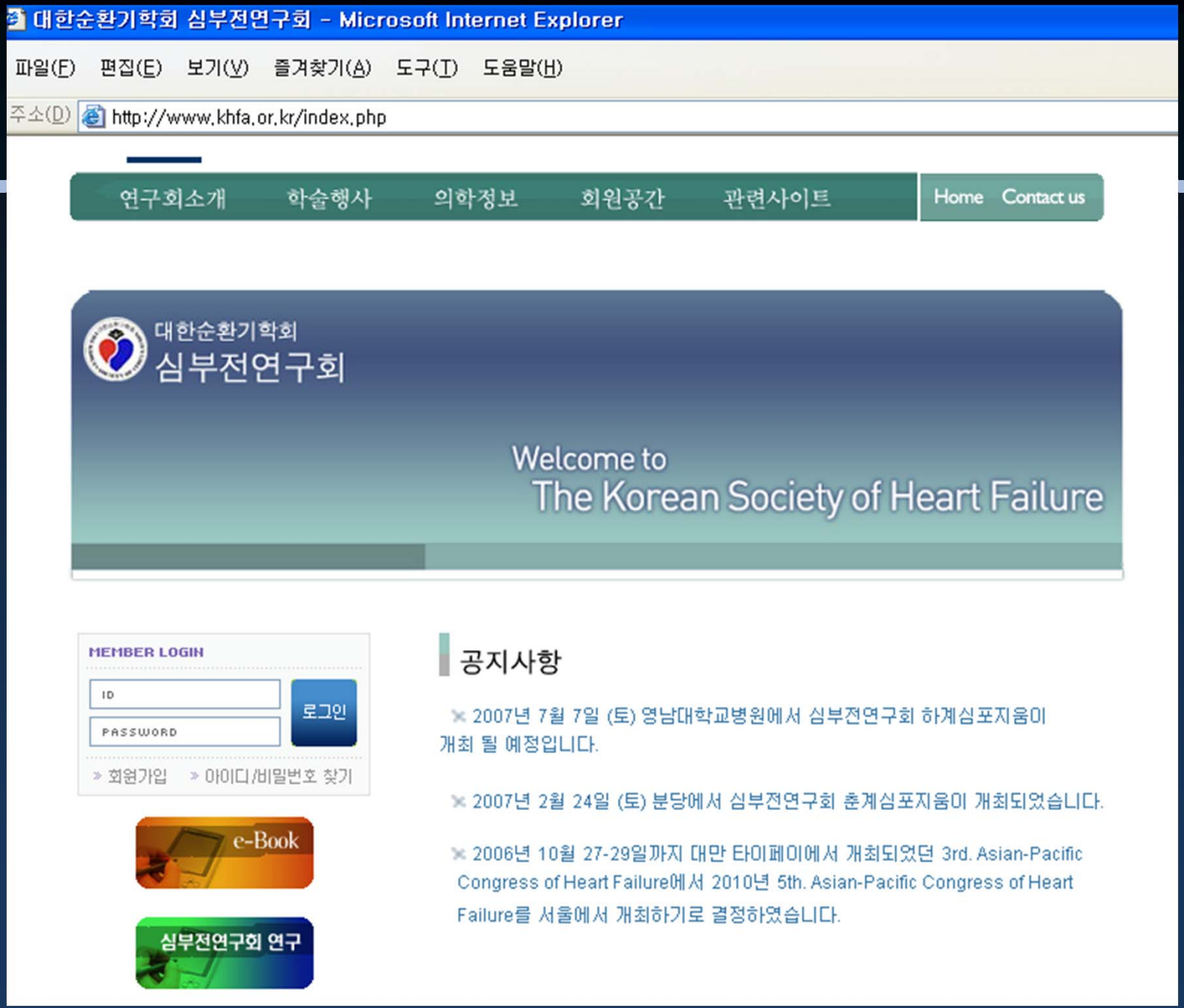
Changes in management of heart failure from 2000 to 2005
Euro Heart Survey on Heart Failure I
versus Euro Heart Survey on Heart Failure II

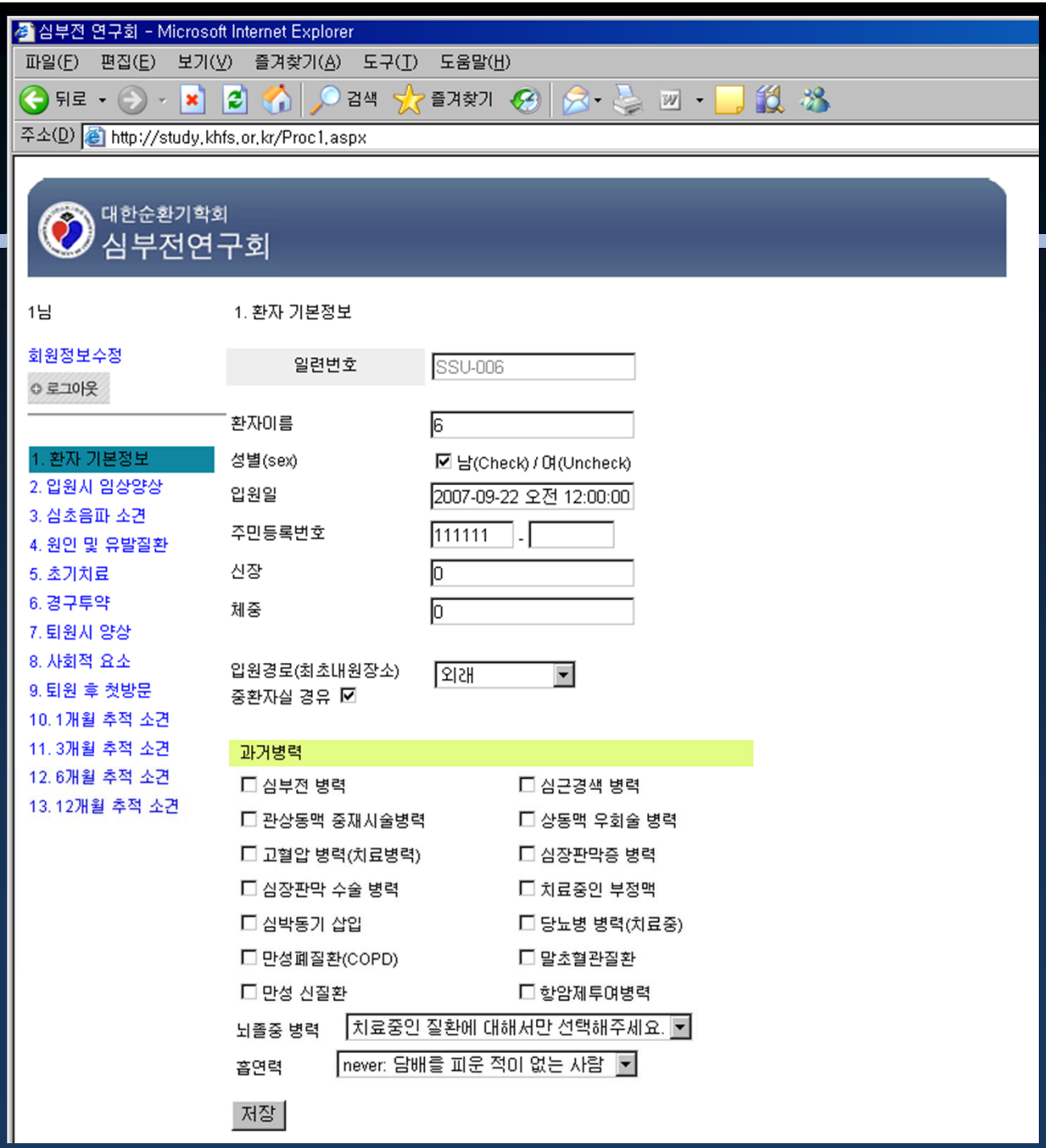
K Dickstein, Norway

Phase 1:
Admitted HF (1998-2003)

Phase 2:
KorHF registry (2006-2009)


Institutions participating in
KorHF Registry
- 28 university hospitals -


대한순환기학회 심부전연구회 - Microsoft Internet Explorer
파일(F) 편집(E) 보기(V) 즐겨찾기(A) 도구(T) 도움말(H)
주소(D) http://www.khfa.or.kr/index.php
연구회소개 학술행사 의학정보 회원공간 관련사이트 Home Contact us
대한순환기학회
심부전연구회
Welcome to
The Korean Society of Heart Failure
MEMBER LOGIN
ID
PASSWORD
로그인
» 회원가입 » 아이디/비밀번호 찾기
e-Book
심부전연구회 연구
공지사항
※ 2007년 7월 7일 (토) 영남대학교병원에서 심부전연구회 하계심포지움이 개최 될 예정입니다.
※ 2007년 2월 24일 (토) 분당에서 심부전연구회 춘계심포지움이 개최되었습니다.
※ 2006년 10월 27-29일까지 대만 타이페이에서 개최되었던 3rd. Asian-Pacific Congress of Heart Failure에서 2010년 5th. Asian-Pacific Congress of Heart Failure를 서울에서 개최하기로 결정하였습니다.


심부전 연구회 - Microsoft Internet Explorer
파일(F) 편집(E) 보기(V) 즐겨찾기(A) 도구(T) 도움말(H)
뒤로 검색 즐겨찾기
주소(D) http://study.khfs.or.kr/Proc1.aspx
대한순환기학회
심부전연구회
1님
회원정보수정
로그아웃
1. 환자 기본정보
2. 입원시 임상양상
3. 심초음파 소견
4. 원인 및 유발질환
5. 초기치료
6. 경구투약
7. 퇴원시 양상
8. 사회적 요소
9. 퇴원 후 첫방문
10. 1개월 추적 소견
11. 3개월 추적 소견
12. 6개월 추적 소견
13. 12개월 추적 소견
1. 환자 기본정보
일련번호
SSU-006
환자이름
6
성별(sex)
남(Check) / 여(Uncheck)
입원일
2007-09-22 오전 12:00:00
주민등록번호
111111 -
신장
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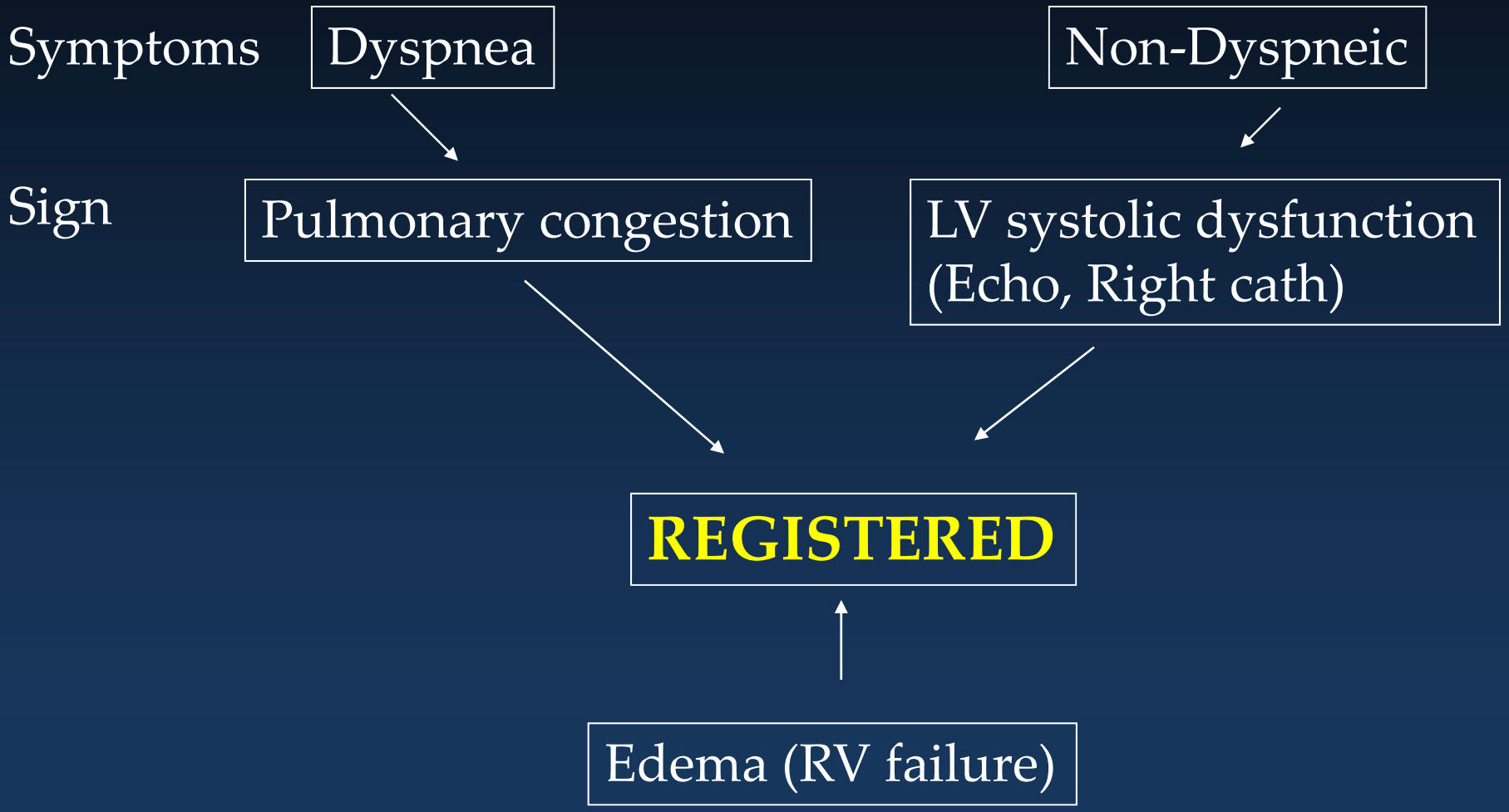
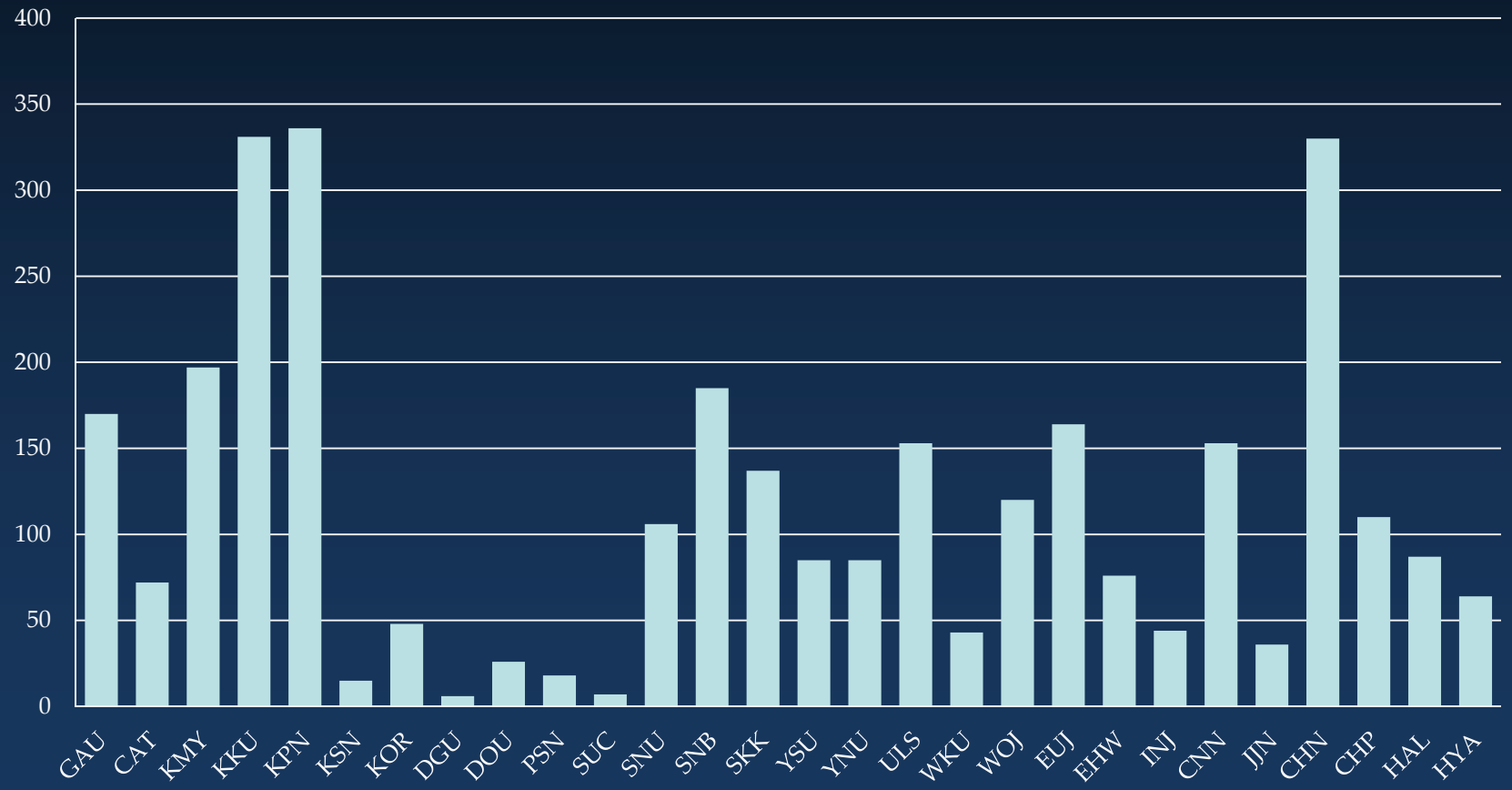
체중
0
입원경로(최초내원장소)
외래
중환자실 경유
과거병력
심부전 병력
심근경색 병력
관상동맥 중재시술병력
상동맥 우회술 병력
고혈압 병력(치료병력)
심장판막증 병력
심장판막 수술 병력
치료중인 부정맥
심박동기 삽입
당뇨병 병력(치료중)
만성폐질환(COPD)
말초혈관질환
만성 신질환
항암제투여병력
뇌졸중 병력
치료중인 질환에 대해서만 선택해주세요.
흡연력
never: 담배를 피운 적이 없는 사람
저장

Inclusion criteria of ADHF



Enrollment : Total 3200 pts

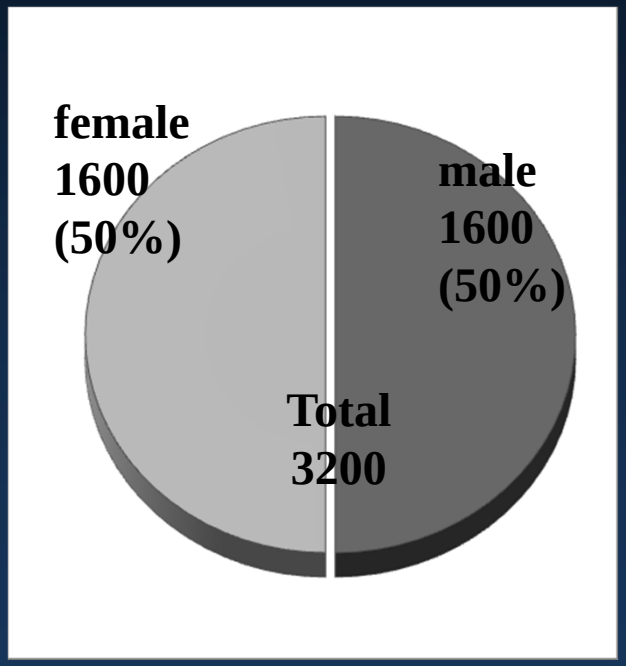


Korean Acute Heart Failure Registry

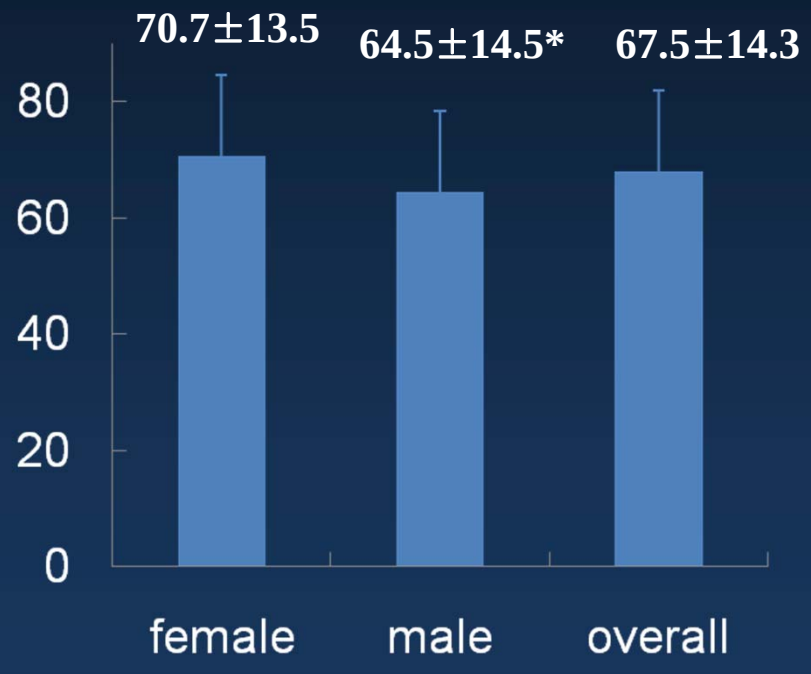
Clinical Features

Baseline Demographic Feature

Sex



Age



* p<0.05

Characteristics	Total	Female, n=1600 (50%)	Male, n=1600 (50%)	p*
Age(year, mean ± SD)	67.6±14.3	70.7±13.5	64.5±14.5	<0.001
BMI	23.2±4.0	23.0±4.2	23.4±3.8	0.009
Previuos medical history				
Heart failure	871 (29.6%)	453 (30.4%)	418 (28.7%)	0.313
Hypertension	1486 (46.5%)	787 (49.2%)	699 (43.7%)	0.002
Diabetes	975 (30.5%)	489 (30.6%)	486 (30.4%)	0.927
Stroke	299 (18.9%)	137 (18.0%)	162 (19.8%)	0.361
Chronic renal disease	295 (9.2%)	134 (8.4%)	161 (10.1%)	0.970
Chronic pulmonary disease	104 (3.5%)	43 (2.9%)	61 (4.2%)	0.055
Underlying disease				
Ischemic heart disease	1544 (52.3%)	828 (53.6%)	716 (46.4%)	<0.001
Hypertension	1143 (36.7%)	596 (38.1%)	547 (35.3%)	0.103
Cardiomyopathy	760 (26.5%)	351 (24.3%)	409 (28.8%)	0.007
Valvular disease	407 (12.7%)	255 (16.4%)	152 (9.7%)	<0.001
Myocarditis	22 (0.7%)	8 (0.6%)	14 (1.0%)	0.187
Infiltrative disease	12 (0.4%)	5 (0.3%)	7 (0.5%)	0.545

*Comparison between female and male groups. BMI = body mass index.

Table 2. Clinical presentation and hospital course

Characteristics	Total	Female, n=1600 (50%)	Male, n=1600 (50%)	p*
Clinical findings				
SBP(mmHg)	130.5±30.2	131.7±30.5	129.3V29.8	0.240
DBP(mmHg)	77.9±18.0	77.7±17.4	78.1±18.7	0.517
Hypotension(SBP<90mmHg)	135(4.3%)	65(4.2%)	70(4.5%)	0.622
PR(bpm)	91.2±25.4	91.5±25.8	91.0±25.0	0.615
NYHA functional class at admission				
I	283(10.5%)	123(9.1%)	160(12.0%)	ns
II	419(15.6%)	196(14.5%)	223(16.7%)	ns
III	1376(51.1%)	685(50.5%)	691(51.6%)	ns
IV	616(22.9%)	352(26.0%)	264(19.7%)	ns
Echo results				
LVEF(mean%)	38.5±15.7	41.6±16.1	35.4±14.7	<0.001
LVEF≥50%	743(26.1%)	481(34.0%)	262(18.3%)	<0.001
Lab. Findings				
Sodium(mM)	138.1±26.4	138.1±5.4	138.1±4.9	0.892
Hemoglobin(mg/dL)	12.4±5.5	11.7±2.1	13.2±2.4	<0.001
Creatinin(mg/dL)	1.5±1.2	1.4±1.2	1.6±1.4	<0.001
Total-cholesterol(mg/dL)	164.1±47.1	167.6±48.7	158.7±43.9	<0.001
NT-proBNP(ng/L)	8461±96002	9456.0±10358.6	7680.1±9341.5	<0.001
Hospital management				
Diuretics IV	1982(68.1%)	1009(68.6%)	973(67.5%)	0.518
Nitrate IV	1042(35.8%)	520(35.4%)	522(36.2%)	0.632
Inotropic agents	711(21.7%)	285(59.3%)	346(62.4%)	0.001
Dobutamine	502(17.2%)	225(15.3%)	277(19.2%)	0.005
Dopamine	276(9.5%)	118(8.0%)	158(11.0%)	0.007
Hemodynamic monitoring	171(5.9%)	84(5.7%)	87(6.0%)	0.707
IABP	96(3.3%)	41(2.8%)	55(3.8%)	0.121
Medication at discharge				
Beta-blocker	1109(58.6%)	567(58.7%)	542(58.4%)	0.926
ACE-inhibitor/ARB	648(53.7%)	321(52.5%)	327(54.9%)	0.417
Both	695(58.4%)	353(58.5%)	342(58.2%)	0.907
Aldosterone antagonist	913(53.1%)	456(52.4%)	457(53.8%)	0.562

*Comparison between expired and alive groups. BMI = body mass index, HR = hazard ratio, CI =confidence interva, NYHA=New York Heart Association, SBP = systolic blood pressure, DBP= diastolic pressure, PR = pulse rate, LVEF = left ventricular ejection fraction, ACE = angiotensin converting enzyme.

Table 3. Clinical factors and predictors for long-term clinical outcomes, univariate analysis

Characteristics	Total	Expired, n=652 (19.6%)	Alive, n=2571 (80.4%)	HR	95% CI	p*
Age(mean)	67.6±14.3	71.6±13.1	66.6±14.5	1.027	1.021-1.034	<0.001
Women	1600(50.0%)	312 (50.1%)	1285 (50.0%)	1.026	0.874-1.205	0.752
BMI(<23KG/m^2)	1412(50.4%)	317(61.9%)	1095(47.9%)	1.781	1.490-2.129	<0.001
Previuos heart failure	870(29.6%)	239(40.9%)	631(26.8%)	1.690	1.428-2.001	<0.001
Non-ischemic heart failure	1410(47.7%)	321(54.2%)	1089(46.2%)	1.352	1.146-1.596	<0.001
Clinical findings						
SBP(mmHg)	130.5±30.2	124.7±30.4	131.9±29.9	0.991	0.988-0.994	<0.001
HR(bpm)	91.2±25.4	91.4±25.1	91.2±25.5	1.000	0.997-1.004	0.780
Dyspnea at rest	616(22.9%)	155(25.2%)	461(21.5%)	1.499	1.238-1.815	<0.001
Echo results						
LVEF(%)	38.5±15.7	38.0±16.2	38.6±15.6	0.995	0.990-1.001	0.113
LVEF≥50%	742(26.1%)	137(26.4%)	605(26.0%)	0.948	0.774-1.160	0.601
Lab. Findings						
Hyponatremia(Na<135mM)	572(18.0%)	180(31.4%)	392(17.0%)	2.226	1.860-2.665	<0.001
Anemia(Hb<12mg/dL)	1316(41.4%)	346(55.5%)	970(38.0%)	2.021	1.719-2.377	<0.001
Azotemia(Cr≥2.0mg/dL)	478(14.9%)	150(24.3%)	328(13.0%)	2.291	1.901-2.761	<0.001
Total-cholesterol(<160mg/dL)	1431(51.1%)	318(58.3%)	1112(49.3%)	1.393	1.169-1.659	<0.001
NT-proBNP≥1000ng/L	1844(85.1%)	374(92.6%)	1470(83.4%)	2.425	1.661-3.541	<0.001
Medication at discharge						
Beta-blocker	1109(58.6%)	137(40.7%)	927(62.5%)	0.441	0.352-0.551	<0.001
ACE-inhibitor/ARB	648(53.7%)	103(39.3%)	545(57.7%)	0.504	0.391-0.650	<0.001
Both	695(58.4%)	116(44.6%)	579(62.3%)	0.517	0.403-0.664	<0.001
Aldosterone antagonist	913(53.1%)	159(46.2%)	754(54.8%)	0.700	0.563-0.869	0.001

*Comparison between expired and alive groups. BMI = body mass index, HR = hazard ratio, CI =confidence interva, SBP = systolic blood pressure, DBP= diastolic pressure, HR = heart rate, LVEF = left ventricular ejection fraction, ACE = angiotensin converting enzyme.

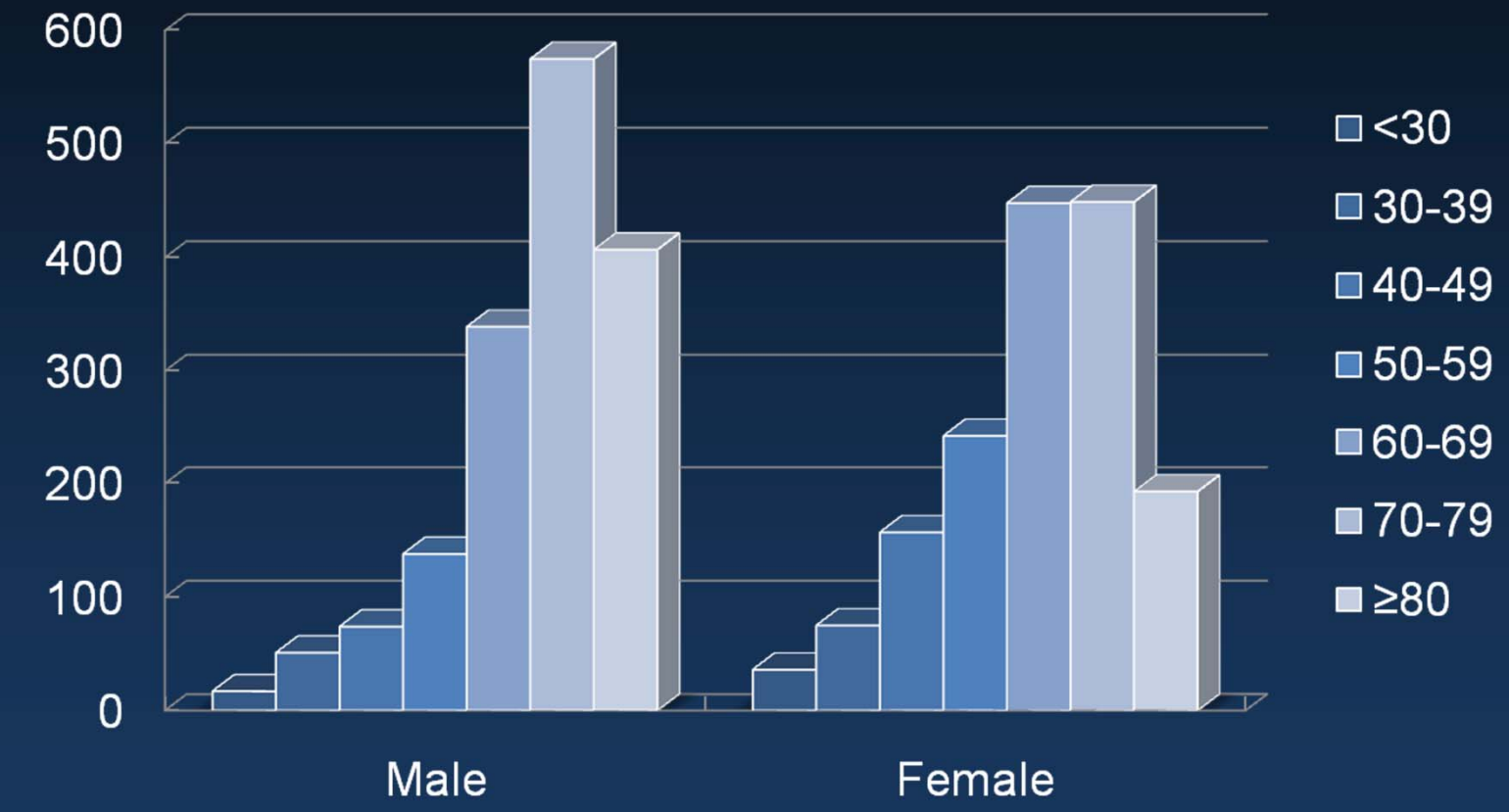
Table 4. Clinical predictors of clinical outcome, multivariate analysis			
Characteristics of Patients	HR	95% CI	p*
Age(mean)	1.023	1.004-1.042	0.020
Previous heart failure	1.735	1.150-2.618	0.009
Anemia(Hb<12mg/dL)	1.973	1.271-3.063	0.002
Hyponatremia(Na<135mM)	1.861	1.184-2.926	0.007
NT-proBNP≥1000ng/L	3.152	1.450-6.849	0.004
Beta-blocker at discharge	0.599	0.360-0.997	0.049

*Comparison between expired and alive groups.

Table 5. Comparisons in acute heart failure trials and KorHF

Characteristics	KorHF	ADHERE	OPTIME
Age(year, mean ± SD)	67.6	72.4	66.5
Gender (Women)	50%	52%	47%
Previuos medical history			
Ischemic heart disease	52.3%	57%	NA
MI	14.2%	31%	48%
Hypertension	46.5%	73%	68%
Diabetes	30.5%	44%	44%
Stroke	18.9%	17%	NA
Chronic renal disease	9.2%	31%	NA
Blood pressure			
SBP(mmHg)	130.5±30.2	144±32.6	120±18
Hypotension(SBP<90mmHg)	4.3%	2%	NA
NYHA functional class at admission			
II	16%	20%	7%
III	51%	44%	46%
IV	23%	32%	47%
Echo results			
LVEF(mean%)	38.5±15.7	34.4±16.1	24±8
LVEF>40%	57.5%	46%	NA
Renal function			
Creatinin(mg/dL)	1.5±1.2	1.8±1.6	1.5±0.5
Creatinin(mg/dL)>2.0mg/dL	15.2%	20%	NA
Management			
Diuretics	68.1%	70%	90%
Nitrate	35.8%	26%	NA
Beta-blocker	58.6%	48%	22%
ACE-inhibitor	17.9%	41%	70%
ARB	39.4%	12%	13%

Age Distribution

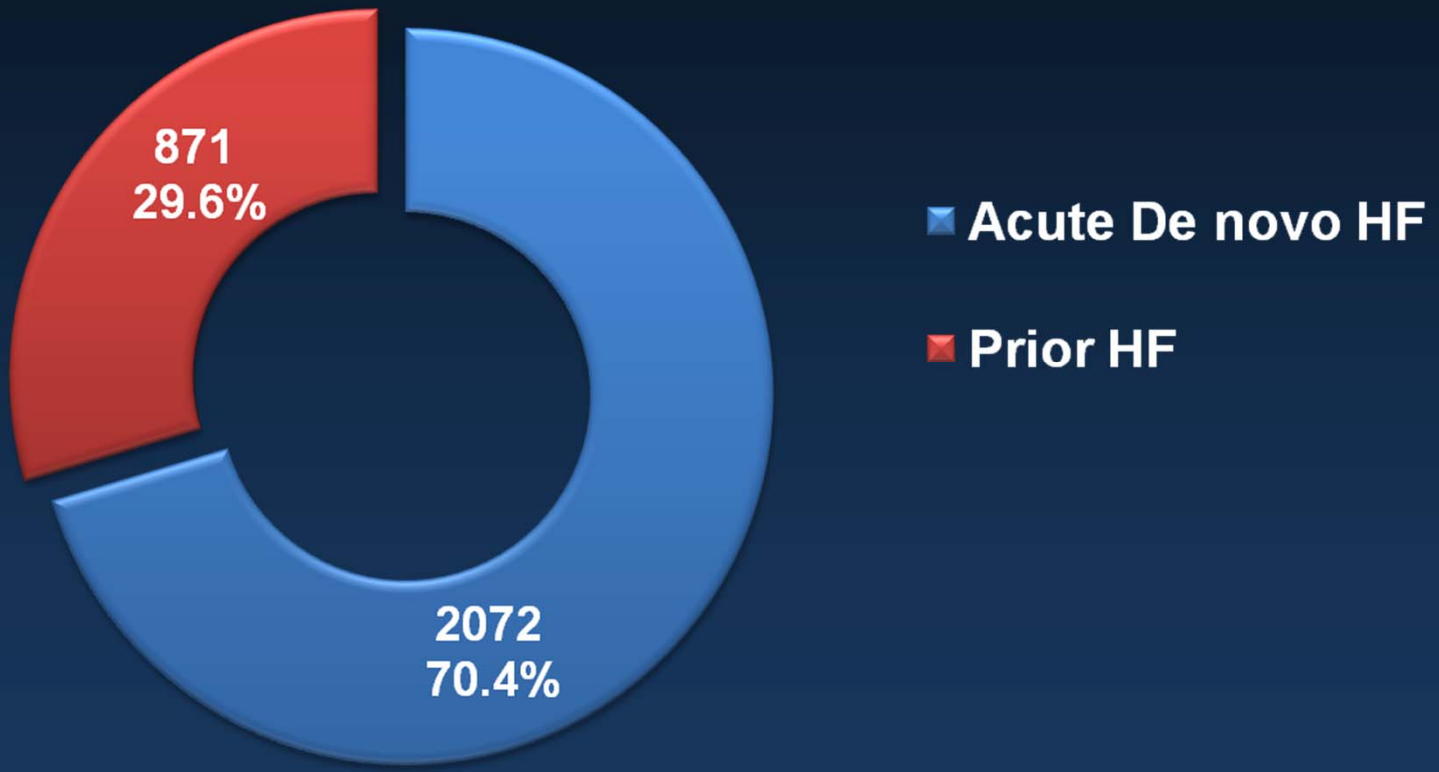


Korean Acute Heart Failure Registry

Risk Factors & Prior Heart Disease

Disease or risk factors	Number(%)
Hypertension	1486(46.4%)
Diabetes	975(30.5%)
History of MI	155(14.2%)
Valvular heart disease	401(12.5%)
Stroke	299(18.9%)
Atrial fibrillation	716(24.5%)
Peripheral vascular disease	52(1.6%)

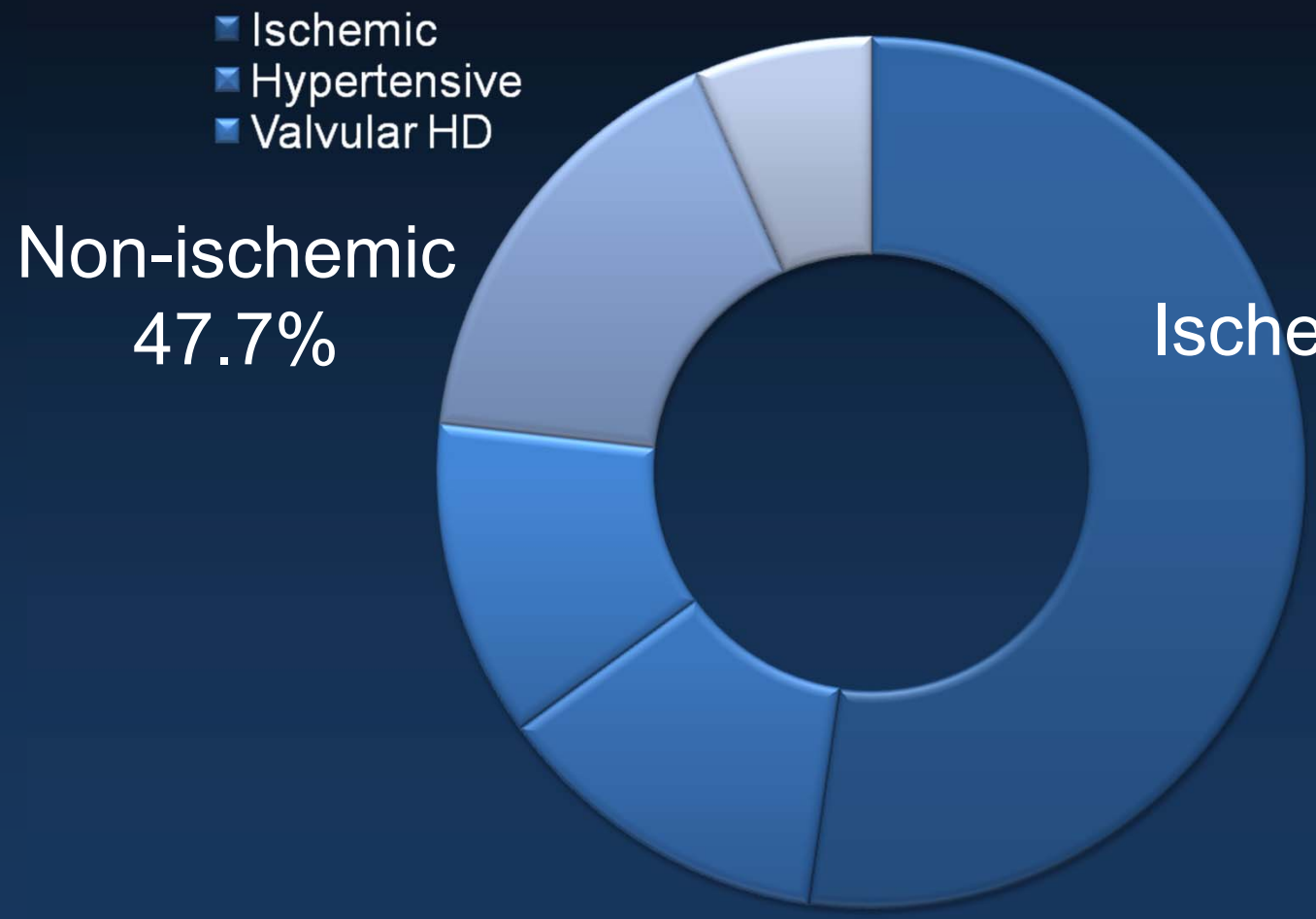
Previous Heart Failure



Characteristics according to clinical feature

	ADHF	De Novo HF	p value
Number(%)	871 (29.6)	2072 (70.4)	
Sex (male)	418 (48.0)	1037(50.0)	NS
Age (SD)	69.0 (13.6)	67.5(14.5)	0.01
SBP (SD)	127.7 (29.1)	132.2 (31.4)	<0.001
DBP (SD)	76.4 (17.0)	79.1 (18.7)	<0.001
Heart rate (SD)	90.0(25.6)	92.4 (26.1)	0.028
Hypertension (%)	393(45.1)	969(46.8)	NS
Diabetes (%)	271 (31.1)	632(30.5)	NS
Atrial fibrillation (%)	268(30.8)	448 (21.6)	<0.001

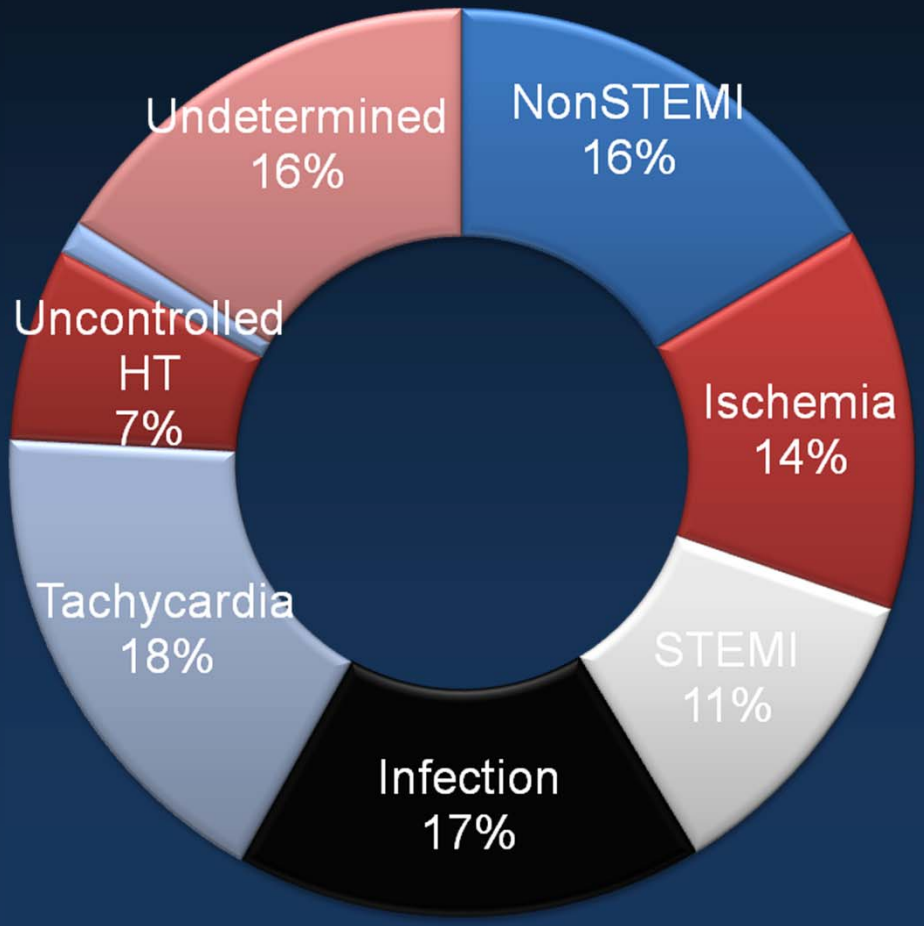
Etiology



Non-ischemic
47.7%

Ischemic etiology
52.3%

Precipitating Factors



- NonSTEMI
- Ischemia
- STEMI

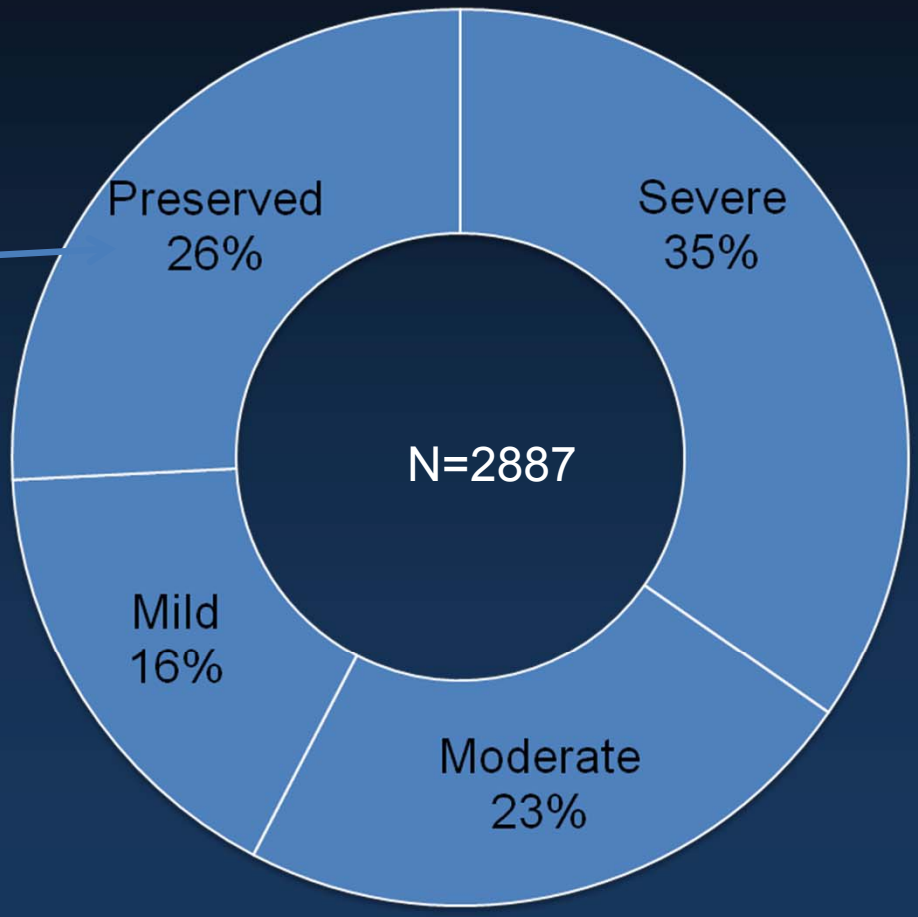
42%

- Infection
- Tachycardia
- Uncontrolled HT
- NSAIDs etc.
- Undetermined

Left Ventricular Systolic Function

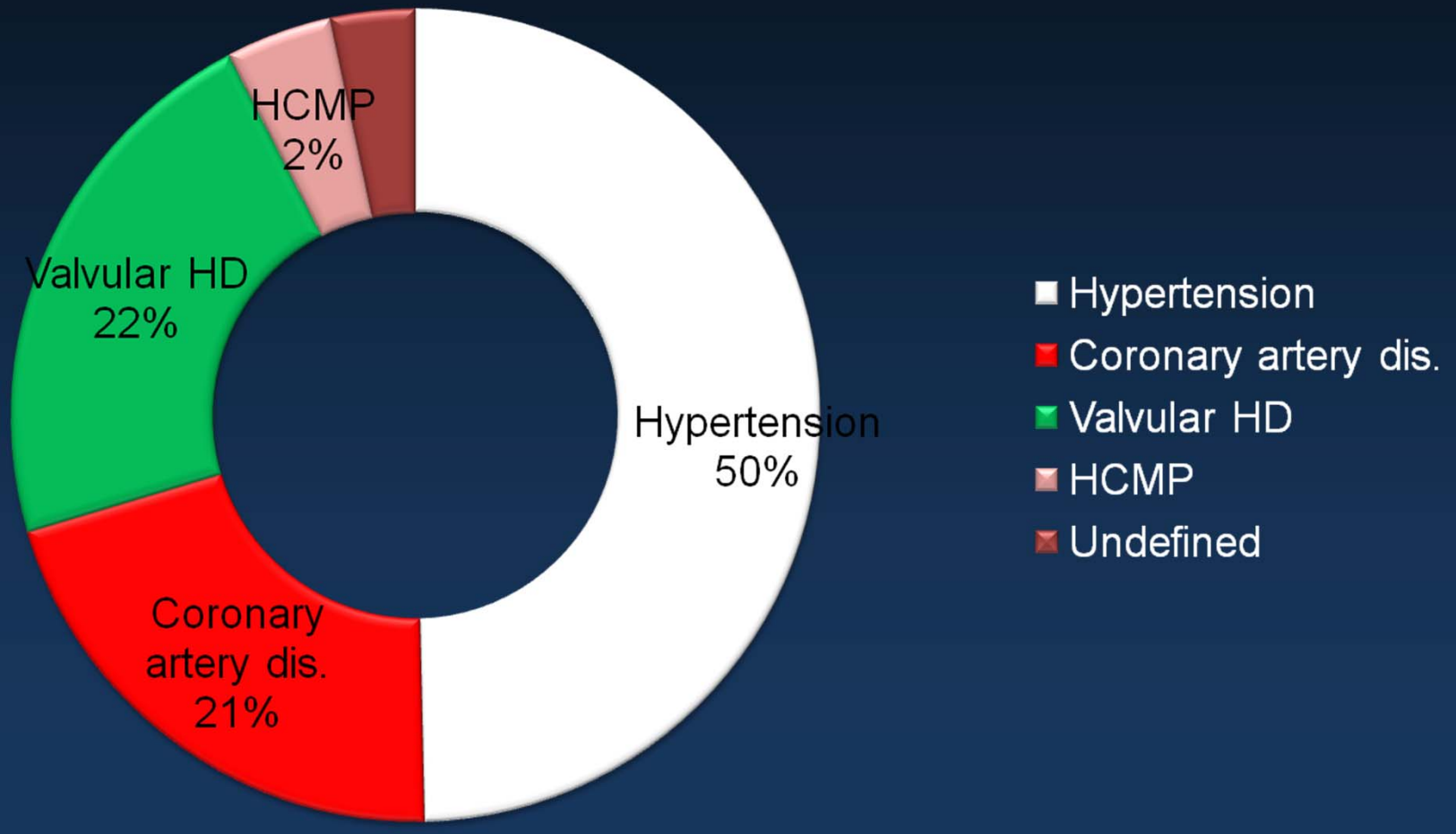
Severe LV systolic dysfunction (EF<30%)

Preserved LV systolic function(EF>50%)



Phase 2 2006-2009

Underlying Disease in Preserved LV systolic function



Korean Acute Heart Failure Registry

Management

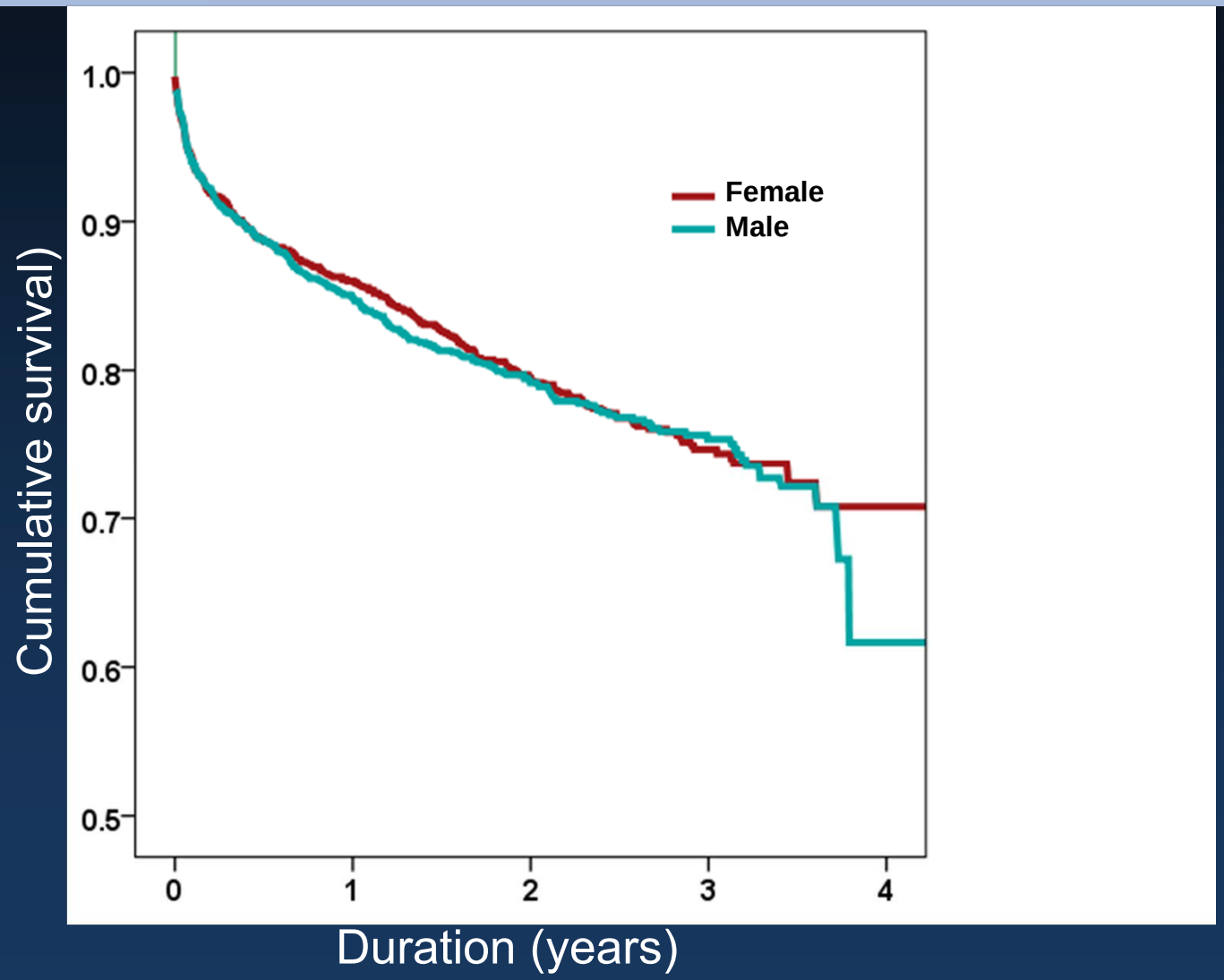
Acute Management

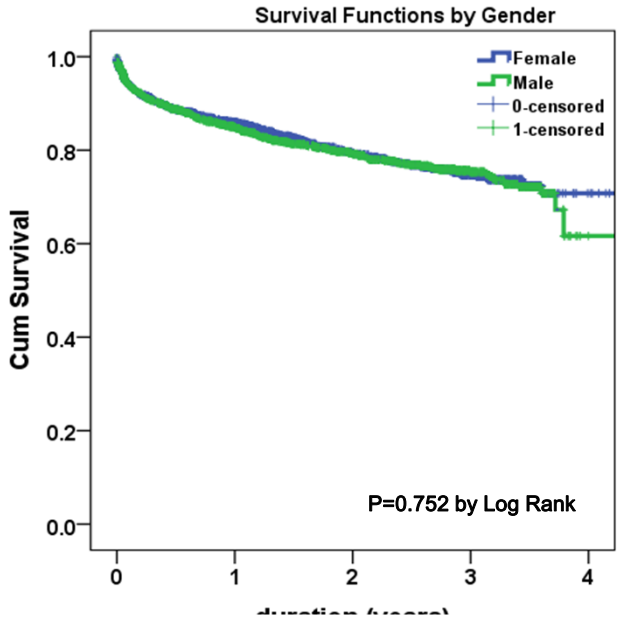
• Mechanical ventilation	249(8.6%)
• IV diuretics bolus	1982(68.1%)
• Dobutamine	502(17.2%)
• Dopamine	276(8.9%)
• IV nitrate (nitroprusside)	1042(35.6%)
• IV Digoxin	446(15.3%)
• ACE inhibitor	1649(51.6%)
• ARB	468(14.6%)
• IABP	96 (3.3%)
• LV assist devive	13(0.4%)

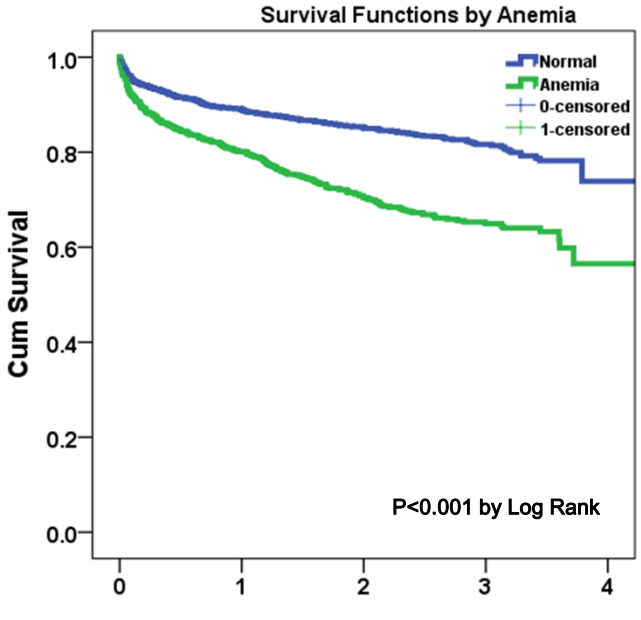
Medication at discharge n=2973

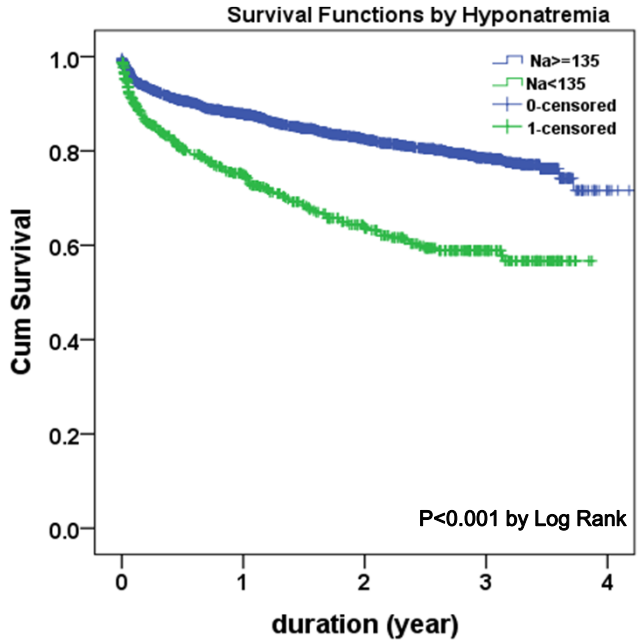
• ACE inhibitor	1379 (46.3%)
• ARB	496 (16.7%)
• Beta blocker	1080 (36.3%)
• Diuretics	1264 (39.5%)

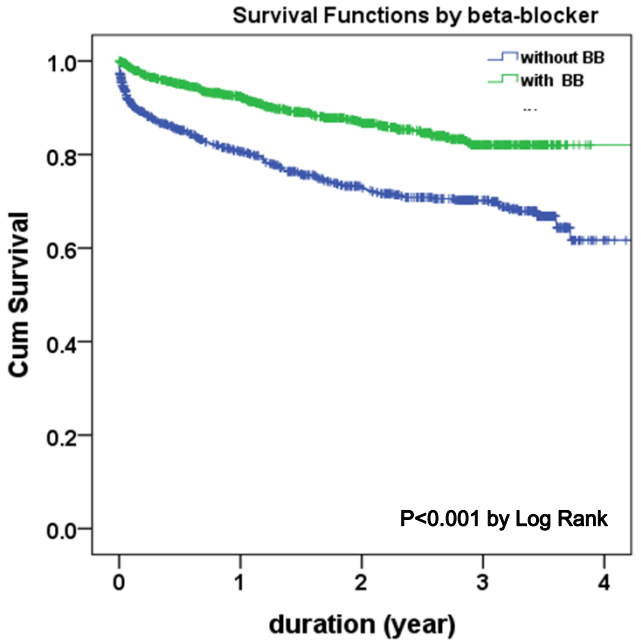
Clinical Outcome & Prognostic Factors


Cumulative survival)
1.0
0.9
0.8
0.7
0.6
0.5
0
1
2
3
4
Female
Male
Duration (years)


Survival Functions by Gender
Female
Male
0-censored
1-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
P=0.752 by Log Rank


Survival Functions by Anemia
Normal
Anemia
0-censored
1-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
P<0.001 by Log Rank


Survival Functions by Hyponatremia
Na>=135
Na<135
0-censored
1-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
P<0.001 by Log Rank
duration (year)


Survival Functions by beta-blocker
without BB
with BB
...
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
P<0.001 by Log Rank
duration (year)

Cardiac Resynchronization Therapy

Patient Indications

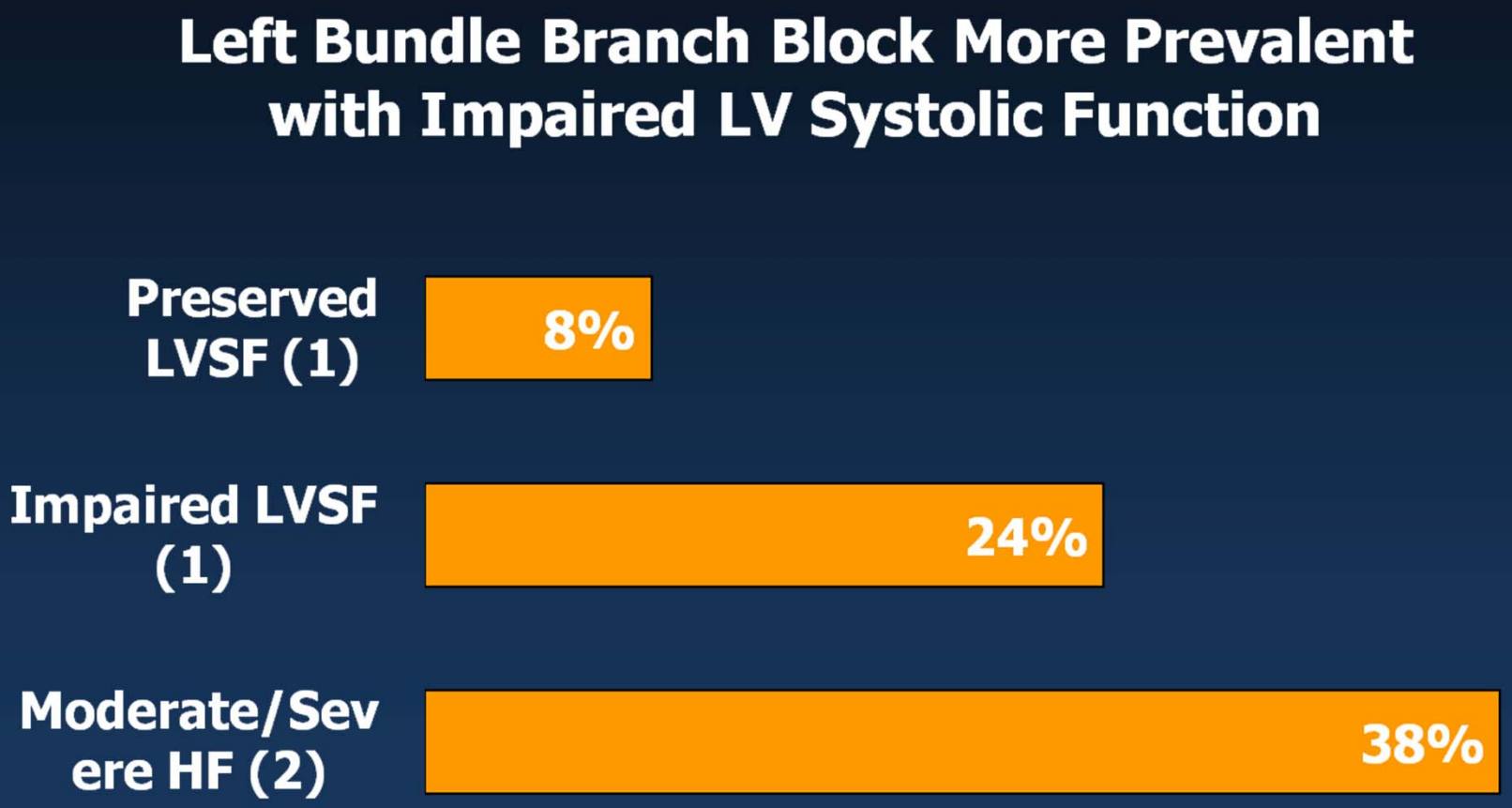
CRT device:

- Moderate to severe HF (NYHA Class III/IV) patients
- Symptomatic despite optimal, medical therapy
- QRS $\geq$ 120 msec
- LVEF $\leq$ 35%

CRT plus ICD:

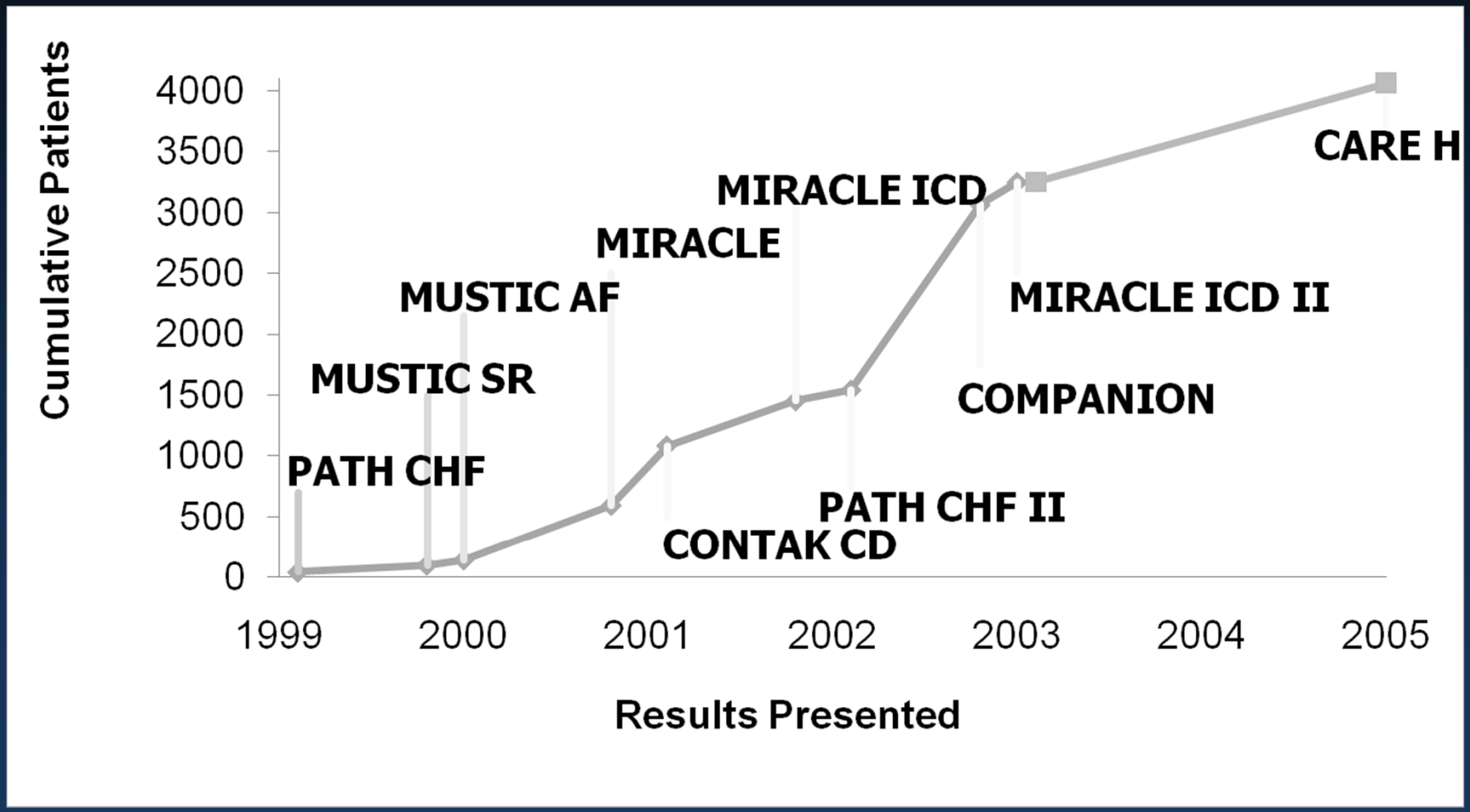
- Same as above with ICD indication

Prevalence of Ventricular Dyssynchrony in Heart Failure



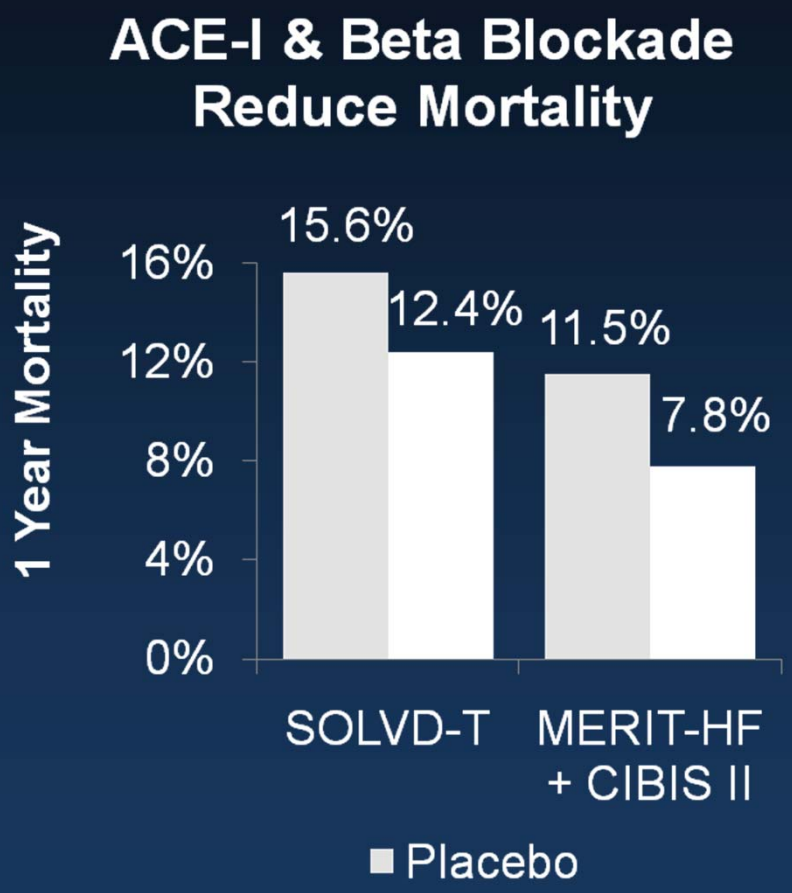
1. Masoudi, et al. JACC 2003;41:217-23
2. Aaronson, et al. Circ 1997;95:2660-7

Cumulative Enrollment in Cardiac Resynchronization Randomized Trials



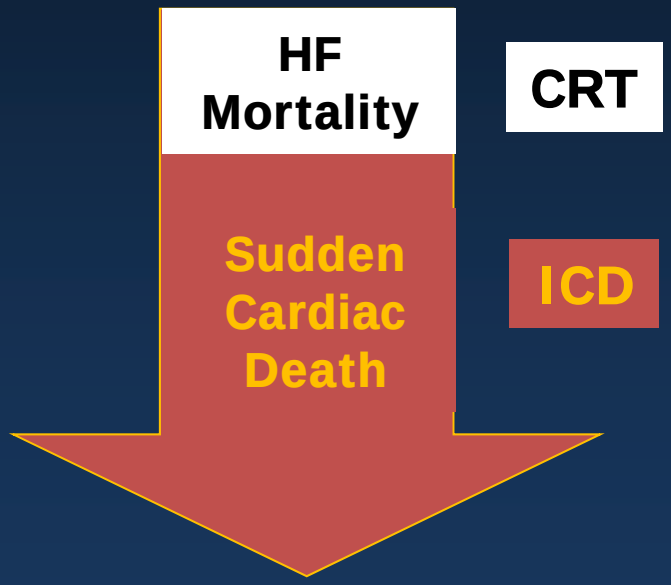
Doug Smith:

Reduced Mortality in Heart Failure



Adapted from McMurray JJV; Heart 1999; 82(Suppl IV):IV14-IV22

Further Reduction with CRT + ICD for Higher Risk Patients



Mortality/Morbidity From Published Randomized, Controlled Trials

		Risk reduction with CRT				
Study (n random.)	**Follow-up**	**Mor-tality & Hosp.**	**Mortal. & HF Hosp.**	**Mor-tality**	**HF Mort.**	**HF Hosp.**
MIRACLE[1] (n=453)	**6 Mo**	**NR**	**39%***	**27%**	**NR**	**50%***
MIRACLE ICD[2] (n=369)	**6 Mo**	**2%**	**0%**	**0%**	**NR**	**NR**
Contak CD[3] (n=490)	**3-6 Mo**	**NR**	**NR**	**30%**	**NR**	**18%**
Meta-analysis[4] (n=1634)	**3-6 Mo**	**NR**	**NR**	**23%**	**51%***	**29%***

1. Abraham WT, et al. *N Engl J Med* 2002;346:1845-53
2. Young JB, et al. *JAMA* 2003;289:2685-94
3. Higgins SL, et al. *JACC* 2003; 42 1454-59
4. Bradley DJ, et al. *JAMA* 2003;289:730-740 [Includes MIRACLE, MIRACLE ICD, Contak CD, and MUSTIC studies]

*** P < 0.05**

NR = Not reported in publication

Individual trials were not powered for mortality or hospitalization

Doug Smith:

CARE-HF: Reductions in morbidity and mortality in elderly CRT patients

- CARE-HF sub-population of patients aged ≥70 years
- CRT reduced mortality and morbidity versus medical treatment alone (MT) in elderly patients

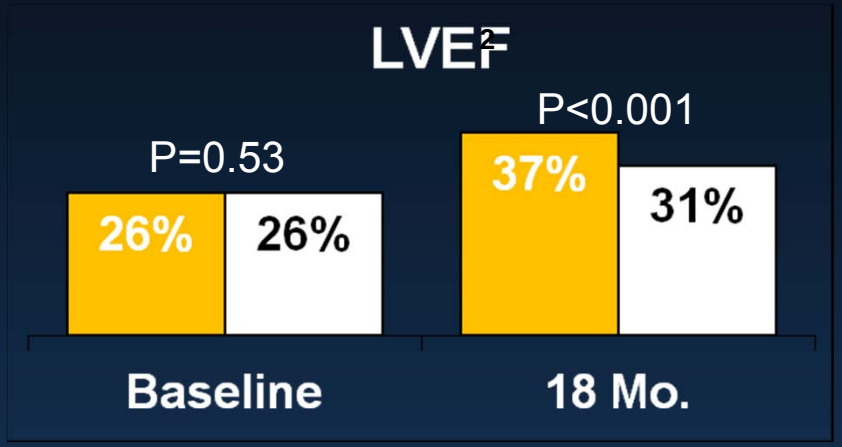
	CRT N=157	Control N=145	Hazard ratio (95% CI)	*P-value*
All cause mortality or un-planned CV hospitalization	43.3%	58.6%	0.67 (0.48-0.92)	0.015
All cause mortality	22.9%	39.3%	0.55 (0.36-0.84)	<0.001
All cause mortality or un-planned HF hospitalization	32.5%	54.5%	0.51 (0.36-0.73)	0.0001

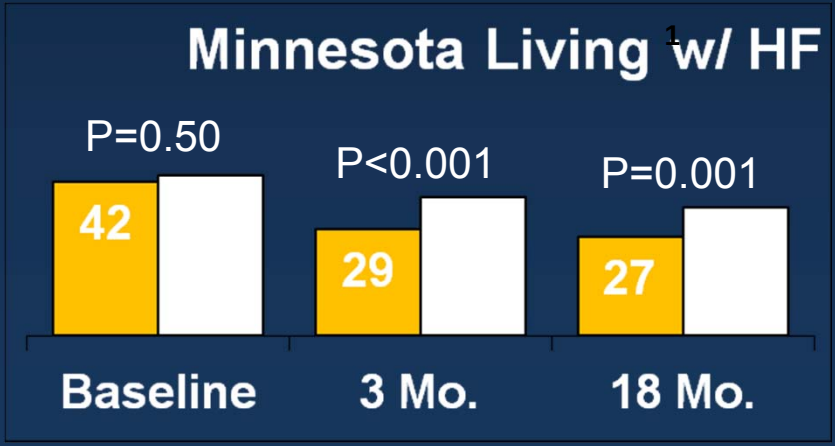
Mabo P et al. Circulation 2008;118:S949 (Abstract 8450). [CARE-HF, a Medtronic sponsored study]

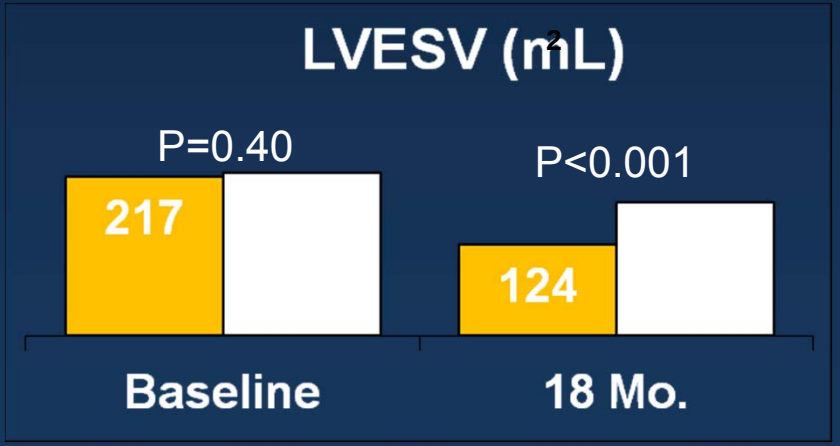
CARE-HF: CRT improves QoL and cardiac function/status in the elderly

- CARE-HF sub-population of patients aged ≥70 years
- Presented at AHA 2008

1. Laviolle et al. Circulation 2008;118:S950b (Abstract 48540).
2. Leclercq C, et al. Circulation 2008;118:S619b (Abstract 826)





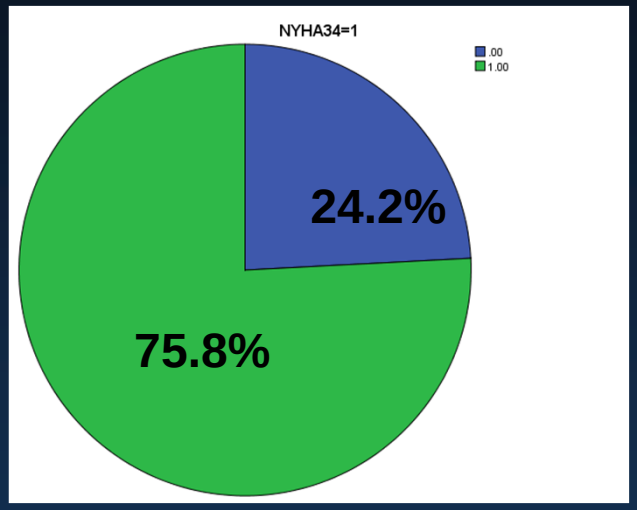


CRT On CRT Off

Data from KorHF regisry

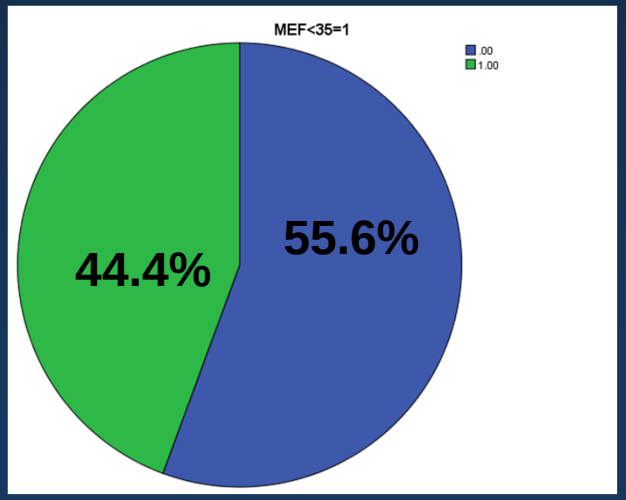
NYHA34=1

		빈도	퍼센트	유효 퍼센트	누적퍼센트
유효	.00	765	18.8	24.2	24.2
	1.00	2400	59.1	75.8	100.0
	합계	3165	77.9	100.0	
결측	시스템 결측값	898	22.1		
합계		4063	100.0		



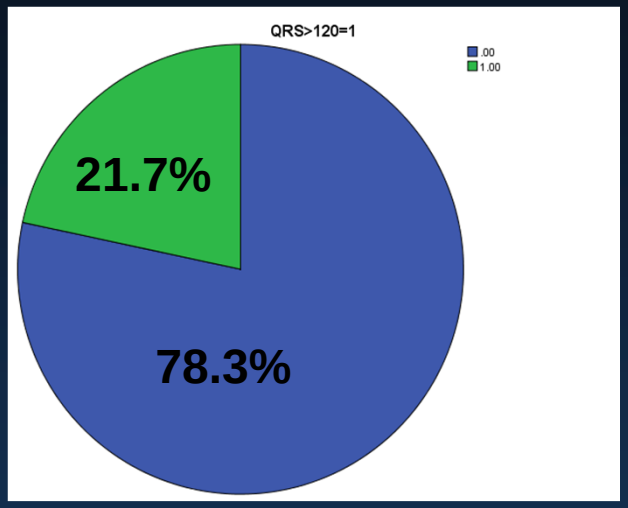
MEF<35=1

		빈도	퍼센트	유효 퍼센트	누적퍼센트
유효	.00	1341	33.0	55.6	55.6
	1.00	1070	26.3	44.4	100.0
	합계	2411	59.3	100.0	
결측	시스템 결측값	1652	40.7		
합계		4063	100.0		

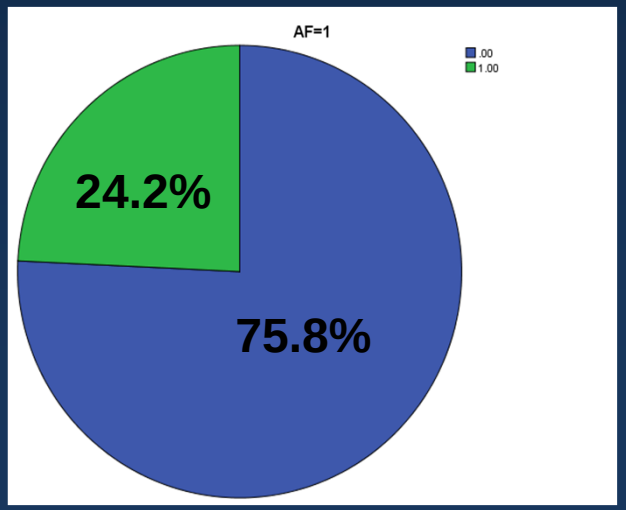


Data from KorHF regisry

QRS>120=1					
		빈도	퍼센트	유효 퍼센트	누적퍼센트
유효	.00	2301	56.6	78.3	78.3
	1.00	636	15.7	21.7	100.0
	합계	2937	72.3	100.0	
결측	시스템 결측값	1126	27.7		
합계		4063	100.0		

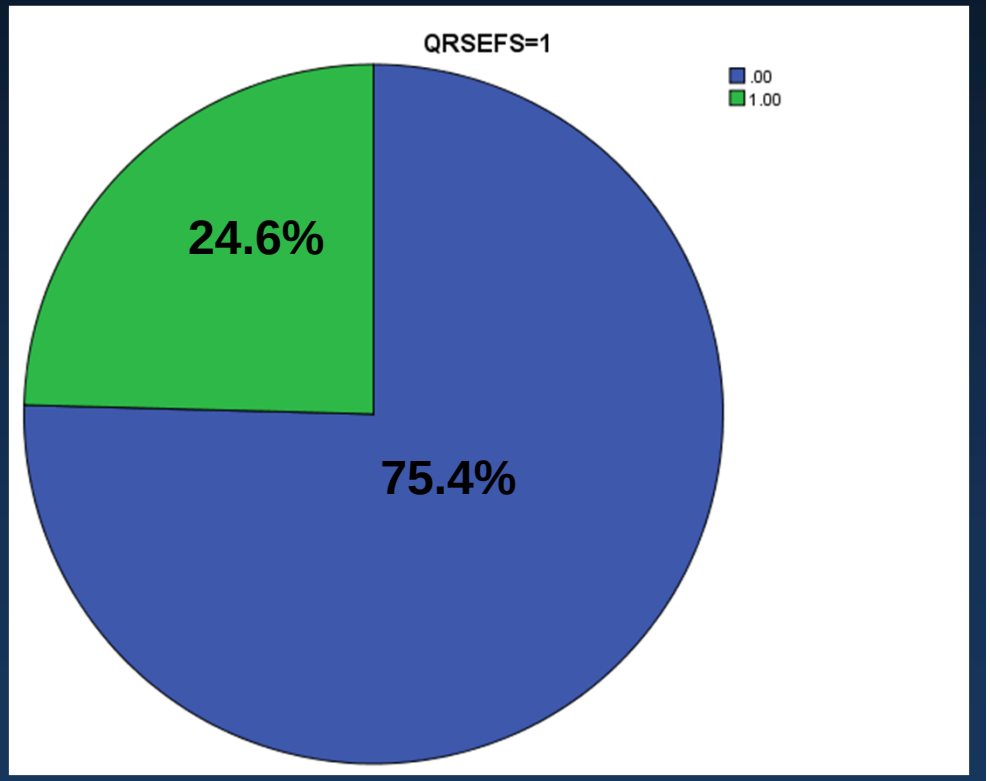


AF=1					
		빈도	퍼센트	유효 퍼센트	누적퍼센트
유효	.00	2472	60.8	75.8	75.8
	1.00	791	19.5	24.2	100.0
	합계	3263	80.3	100.0	
결측	시스템 결측값	800	19.7		
합계		4063	100.0		



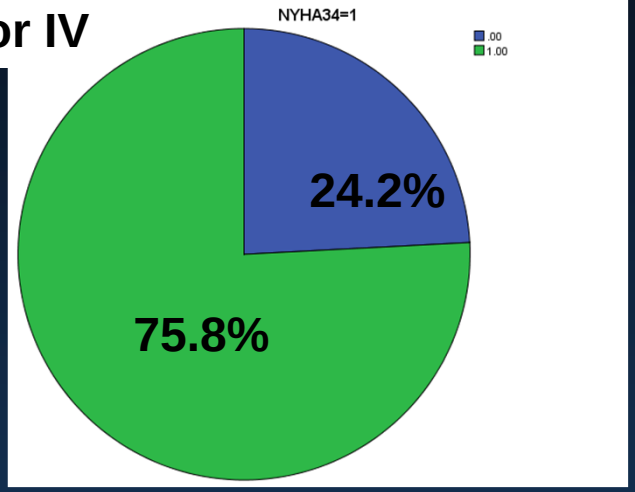
Data from KorHF regisry

QRSEFS=1					
		빈도	퍼센트	유효 퍼센트	누적퍼센트
유효	.00	319	7.9	75.4	75.4
	1.00	104	2.6	24.6	100.0
	합계	423	10.4	100.0	
결측	시스템 결측값	3640	89.6		
합계		4063	100.0		

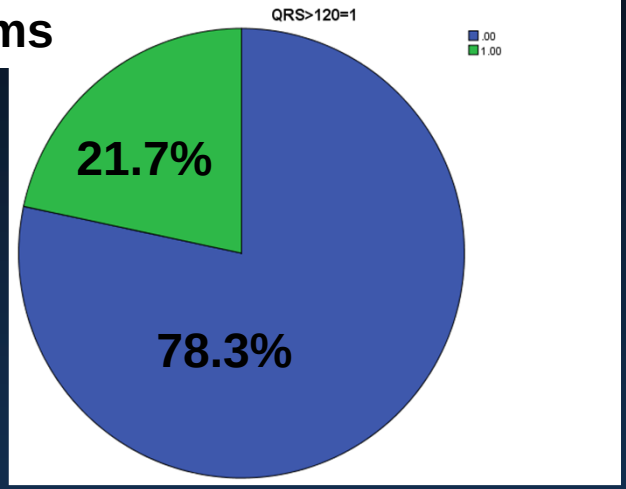


Data from KorHF registry

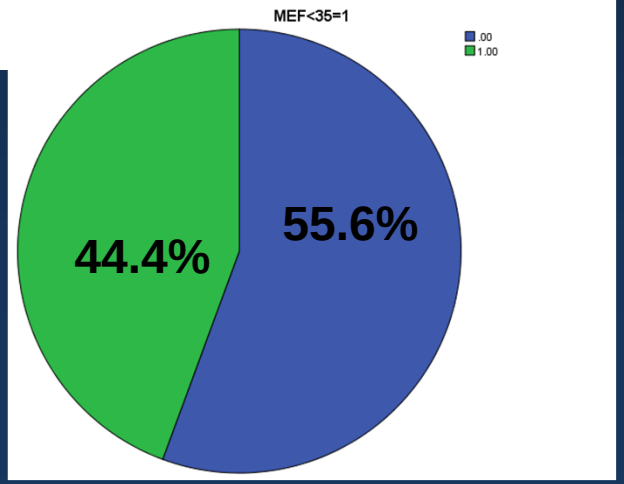
NYHA III or IV



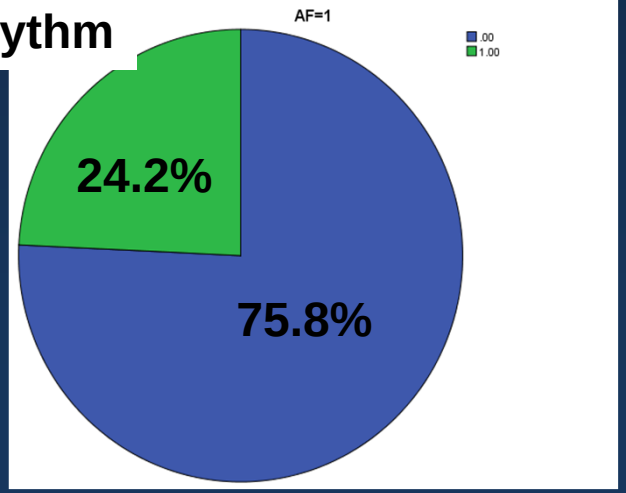
QRS>120ms



EF<35%



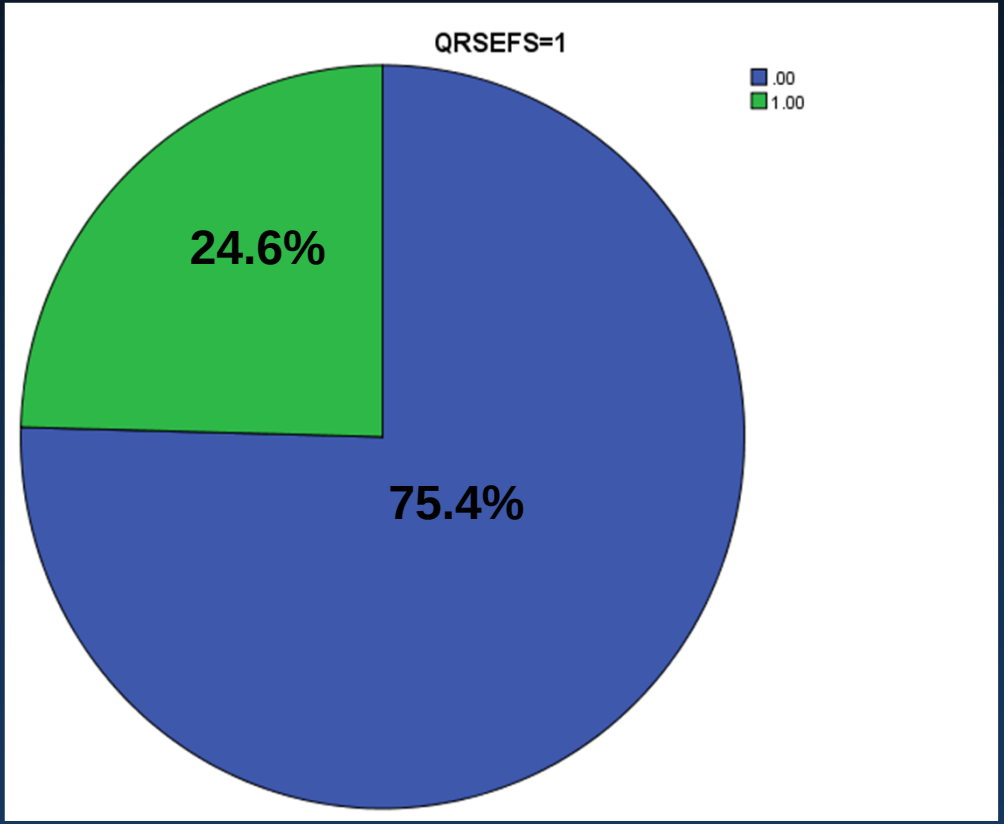
Sinus Rhythm



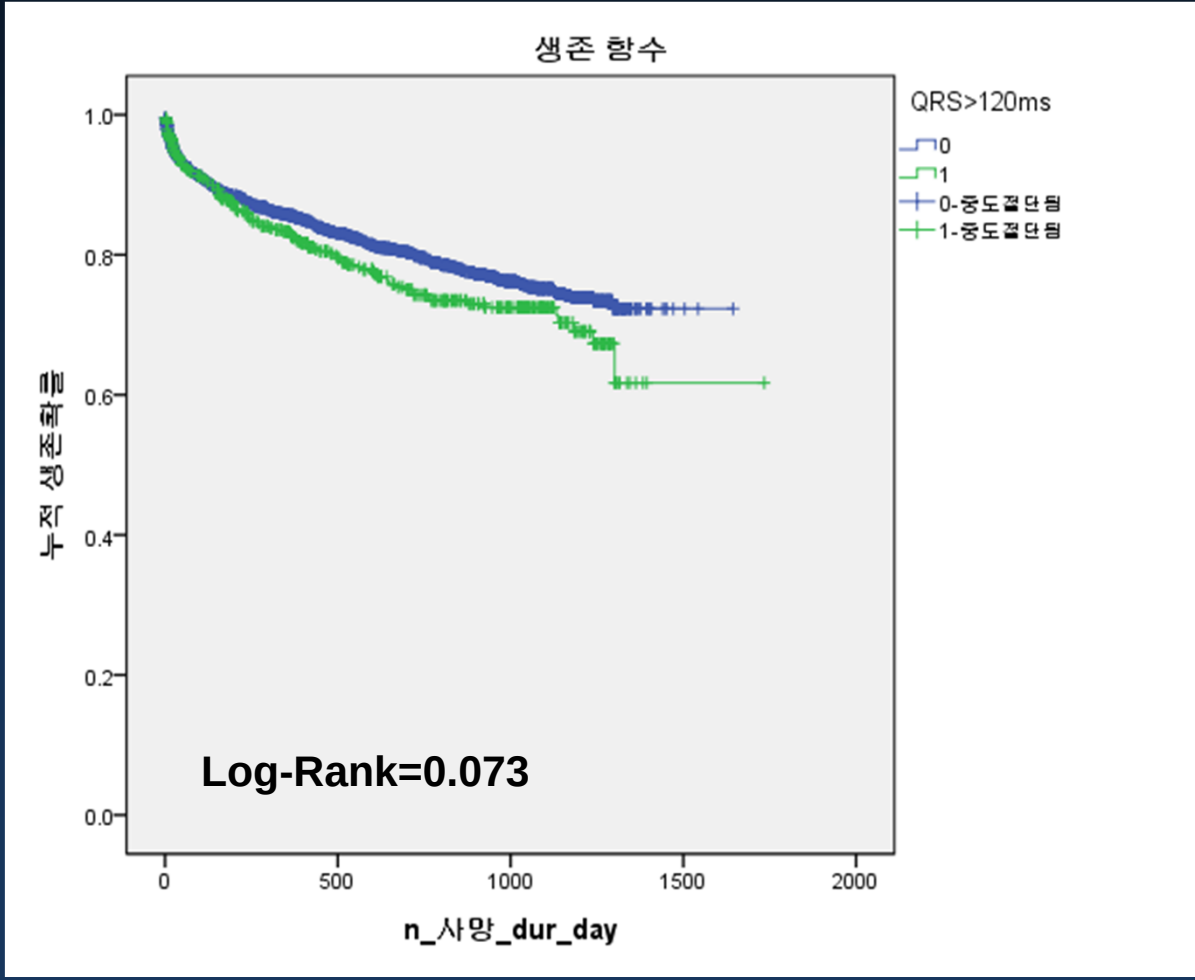
Data from KorHF regisry

CRT indicated HF

Estimated patients 2.6 years
3200 X 24.6% = 787



Data from KorHF regisry



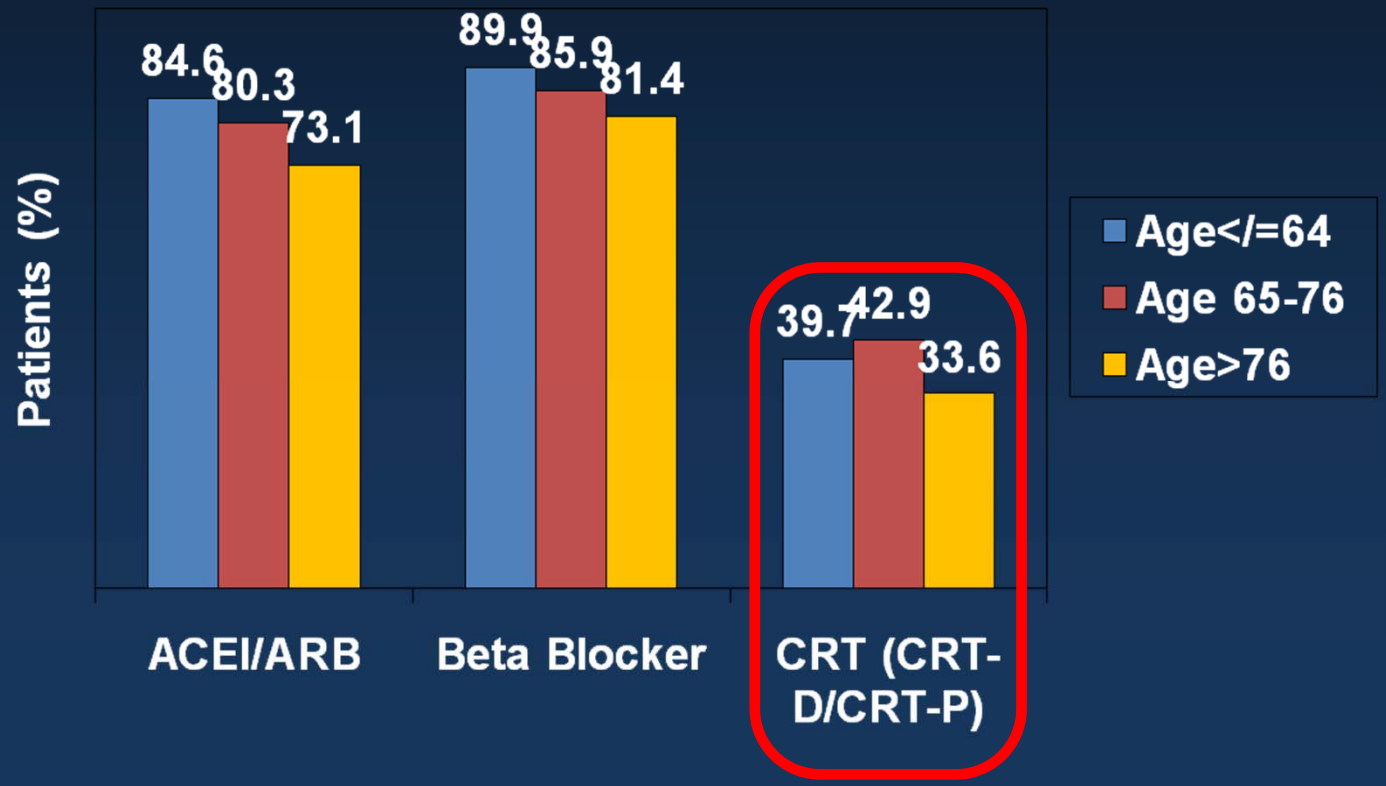
CRT Implantation in Korea

2000-2010

Findings from IMPROVE HF:
Underutilization of CRT in Elderly

- Underutilization of CRT is exaggerated in eligible elderly HF patients

Patients Receiving Recommended HF Therapies by Age Tertiles at Baseline (All Patients)



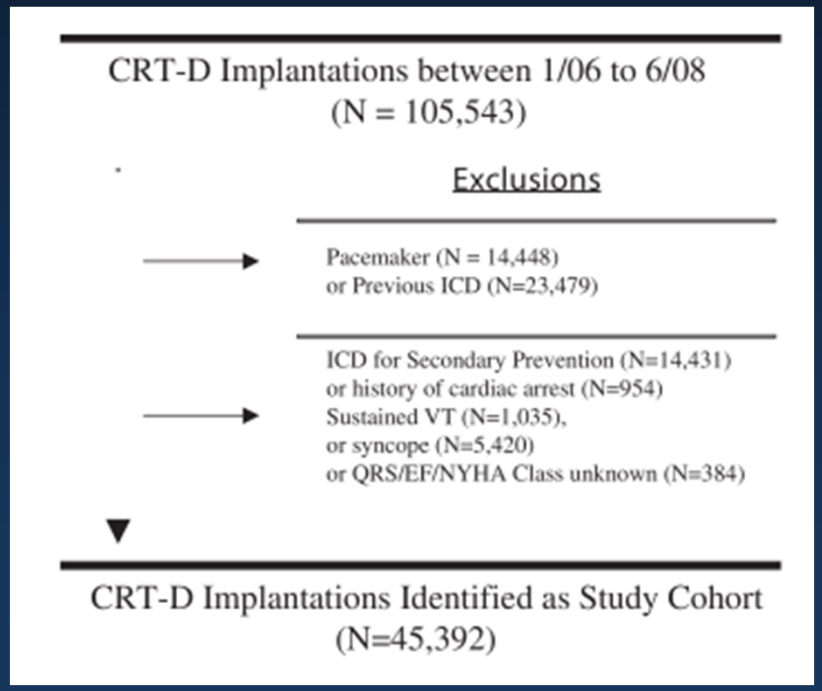
Yancy C et al. J Cardiac Fail 2007;13(suppl):S158. Abstract 290.

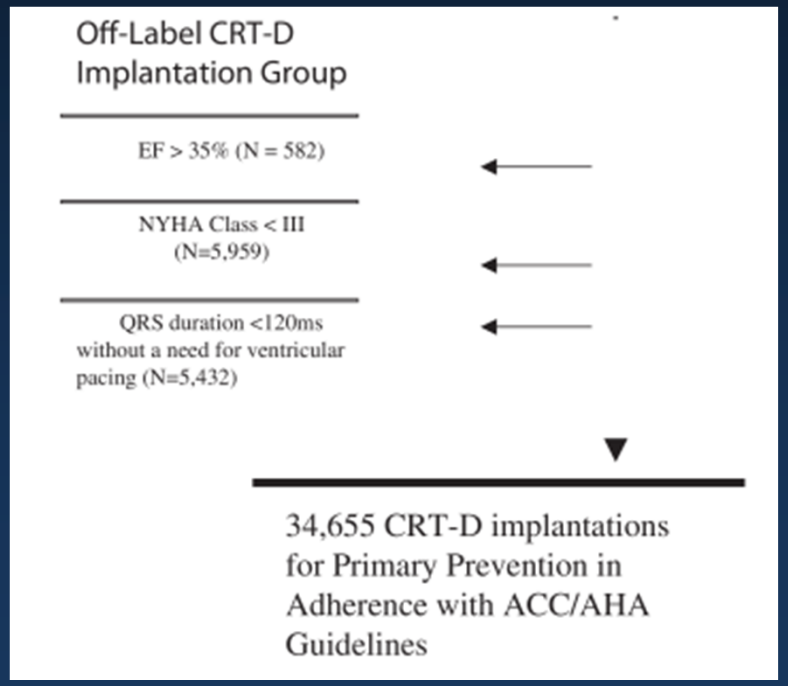
QUARTERLY FOCUS ISSUE: HEART RHYTHM DISORDERS Clinical Research

Cardiac Resynchronization

Prevalence and Predictors of Off-Label Use of Cardiac Resynchronization Therapy in Patients Enrolled in the National Cardiovascular Data Registry Implantable Cardiac-Defibrillator Registry

Adam S. Fein, MD,* Yongfei Wang, MS,† Jeptha P. Curtis, MD,†
Frederick A. Masoudi, MD, MSPH,‡‖ Paul D. Varosy, MD,§ Matthew R. Reynolds, MD, MSc,*
on behalf of the National Cardiovascular Data Registry
Boston, Massachusetts; New Haven, Connecticut; and Denver, Colorado





JACC 2010. 56;777-73

Nearly 1 in 4 patients receiving CRT devices in the study time frame did not meet guideline-based indication
Given the evolving evidence base supporting the use of CRT, these practices require careful scrutiny. (J Am
Coll Cardiol 2010;56:766–73) © 2010 by the American College of Cardiology Foundation

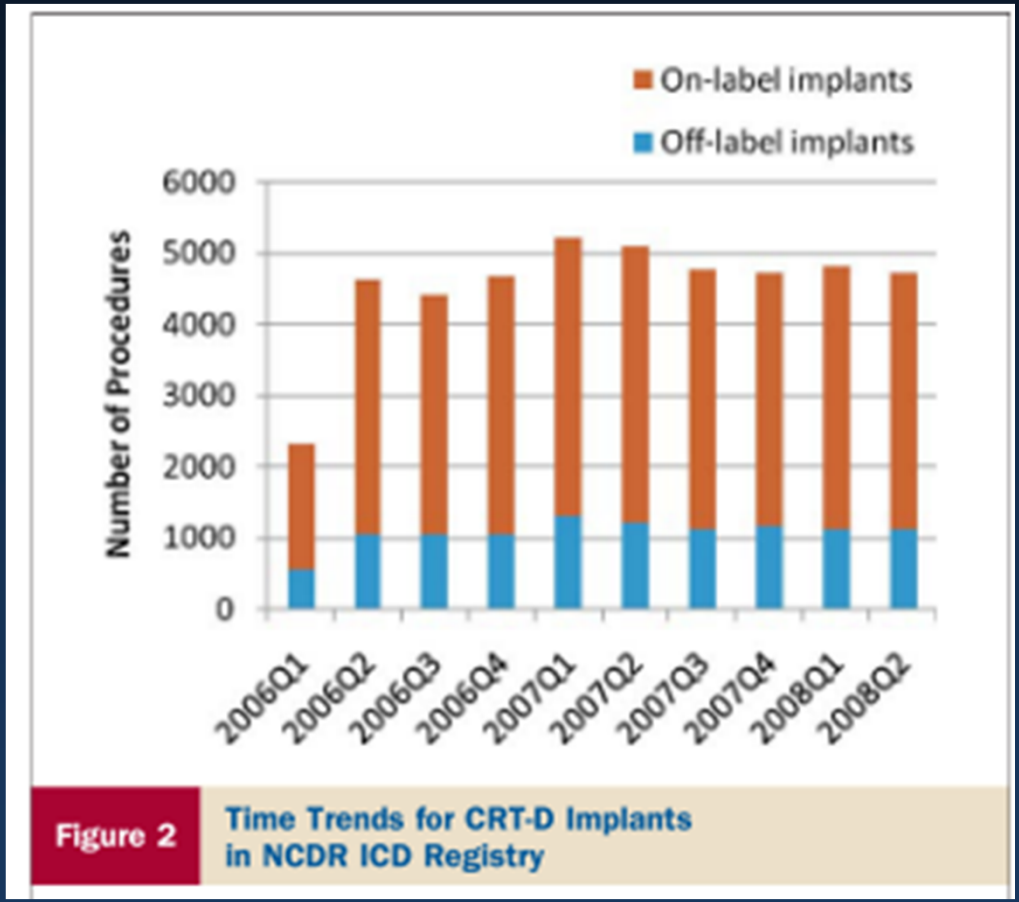


Figure 2 Time Trends for CRT-D Implants in NCDR ICD Registry

JACC 2010. 56;777-73

Conclusions

1. Portion of HF patients who are indicated for CRT in KorHFR is 24.6%, which is comparable to other observations.
2. However, only a portion of them were managed with proper device therapy.
3. More active CRT/ICD therapy is warranted.

From **2011**

Especially, participation to nation-wide registry, **KorHF2**, is recommended.