

# Heart Failure with Preserved Systolic Function

## EPIDEMIOLOGY



**Michele Senni, MD, FESC**

*U.S.D. di Medicina Cardiovascolare*

Dipartimento Cardiovascolare

Ospedali Riuniti di Bergamo, Italy

**PULMONARY EDEMA IN CORONARY-  
ARTERY DISEASE WITHOUT  
CARDIOMEGLALY**

**Paradox of the Stiff Heart**

**ARTHUR DODEK, M.D.,  
DONALD C. KASSEBAUM, M.D.,  
AND J. DAVID BRISTOW, M.D.**

# “Diastolic Heart Failure: Miles to Go Before We Sleep”

*“Patients with diastolic heart failure likely represent the largest group of patients with a cardiovascular disorder of substantial public health impact who have not been systematically studied.”*

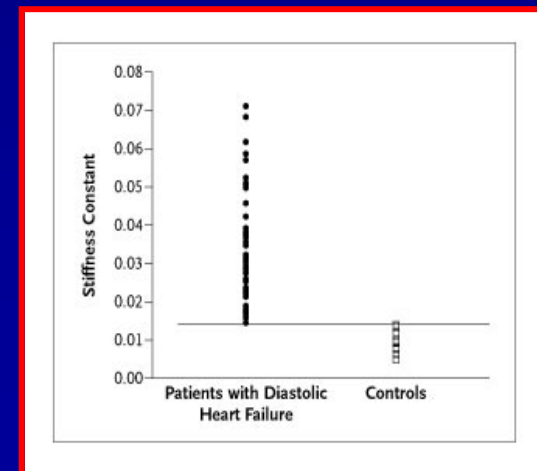
Lynne W. Stevenson

Am J Med, 2000

# Heart Failure with Preserved Systolic Function or Diastolic Heart Failure

“Heart Failure with Preserved Systolic Function is a **descriptive** approach that makes no assumptions about our knowledge about the pathophysiology of this disorder”  
(Burkoff D, Maurer MS, Packer M. Circulation 2003)

“The **predominant pathophysiological cause** of heart failure in these patients is abnormal diastolic function. Therefore, is appropriate to use the term “Diastolic Heart Failure” to describe the abnormalities in these patients”  
(Zile MR, Baicu CF, Gaash WH. NEJM 2004)





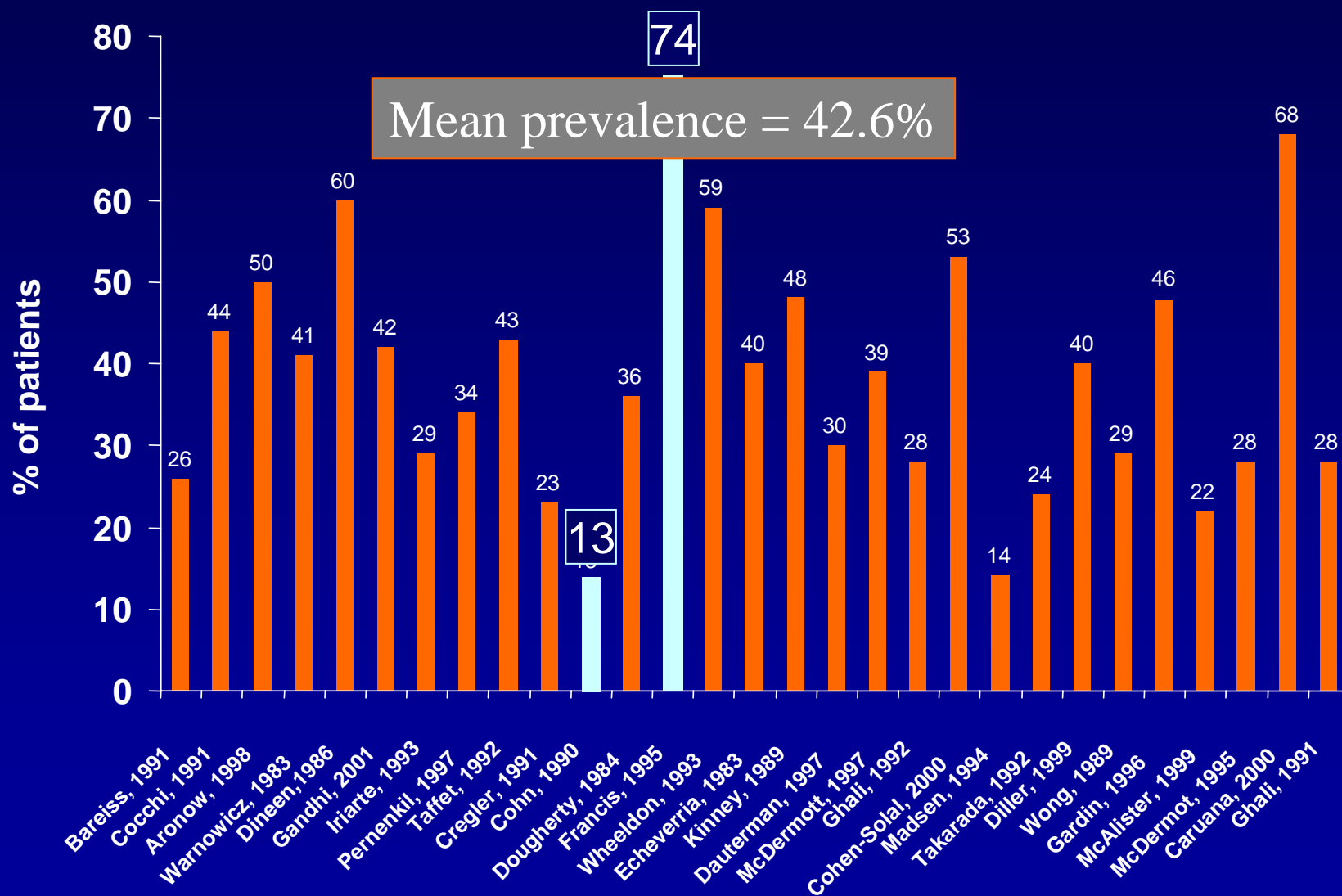
*Systolic  
HF*

**DHF**



# Prevalence of DHF among patients with CHF

## REFERRAL STUDIES



# Prevalence of DHF

## Studies were limited by:

- Referral bias
- Small number of patients
- Outpatients and/or hospitalized patients
- Different range of age of the populations
- Variable definitions of HF
- EF evaluation: percentage of total population, timing, normal cut-off, imaging modalities and methods

# Community Studies

- Community based setting (population based cohort): Framingham, Olmsted, Göteborg, Rotterdam, Glasgow, Finnish
- *Characteristics:*
  - Free of referral bias (etiology, ie HCM, DCM, CAD, etc; HF severity and prognosis)
  - Study captures a population living in a given area

# Prevalence of DHF in the community

Author-year	Study	#pts	Age range	CHF criteria	Normal EF (SF)	Prevalence of DHF among HF	Population prevalence of DHF
Kupari M 1997	Helsinki Ageing Study	501	75-86	Helsinki	(25%)	72%	4.2%
Mosterd A 1999	Rotterdam Study	5540	≥55	Rotterdam	(25%)	71%	2.8%
Yip GW 1999	Honk Kong		all ages	Clinical dx	45%	Mean 56.4%	NR
Devereux R 2000	Strong Heart Study	3638	45-74	Framingham	54%		1.6%
Cortina A 2001	Asturia Spain	391	>40	Framingham	50%	59%	Mean 2.5%
Hedberg P 2001	Vasteras Sweden	433	>75	Clinical dx	43%	46%	
Ceia F 2002	EPICA study	5434	>25	ESC	45%	40%	1.7%
Redfield M 2003	Olmsted County	2042	≥45	Framingham	50%	44%	1.1%

ORIGINAL ARTICLE

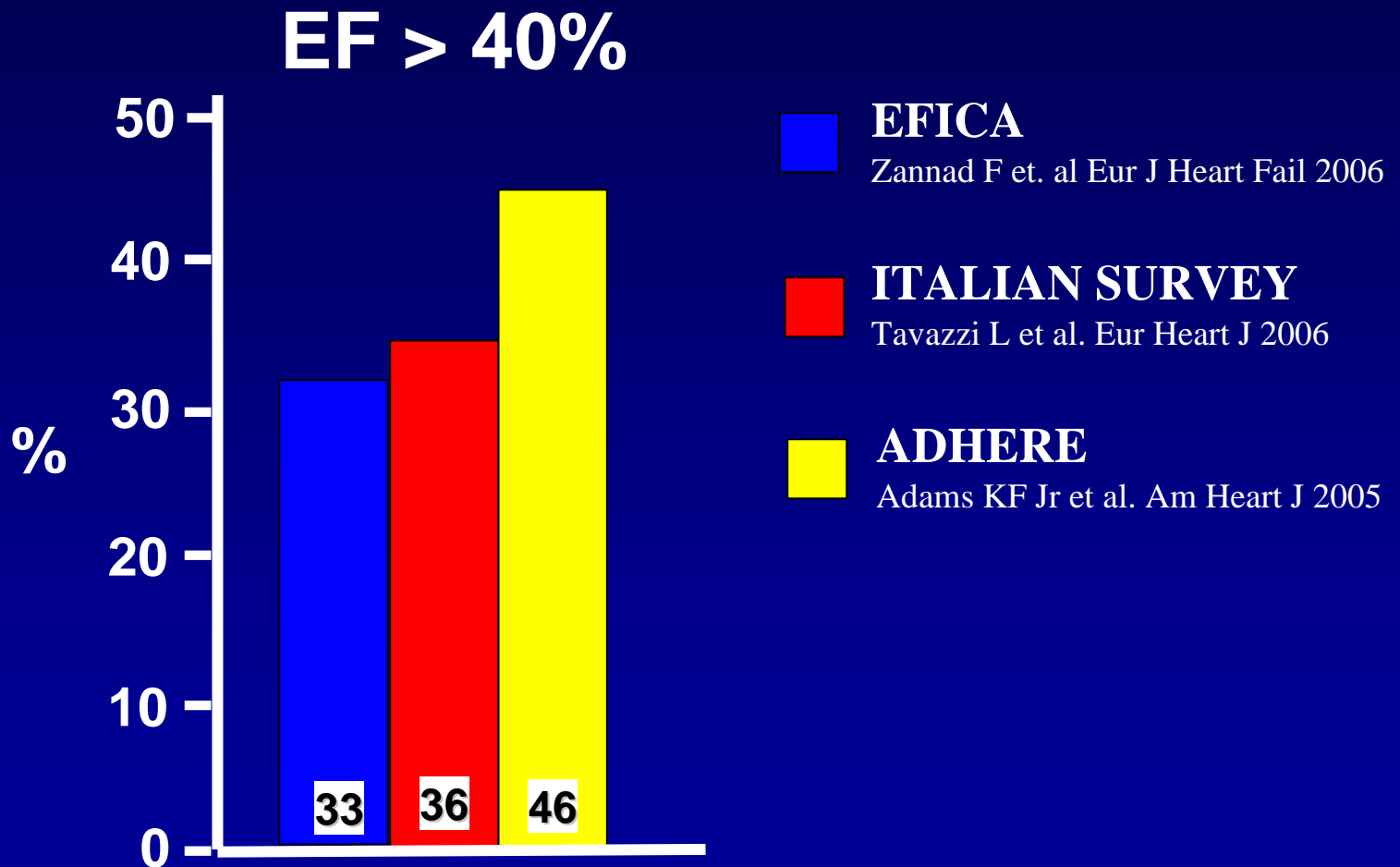
## Trends in Prevalence and Outcome of Heart Failure with Preserved Ejection Fraction

Theophilus E. Owan, M.D., David O. Hodge, M.S., Regina M. Herges, B.S.,  
Steven J. Jacobsen, M.D., Ph.D., Veronique L. Roger, M.D., M.P.H.,  
and Margaret M. Redfield, M.D.

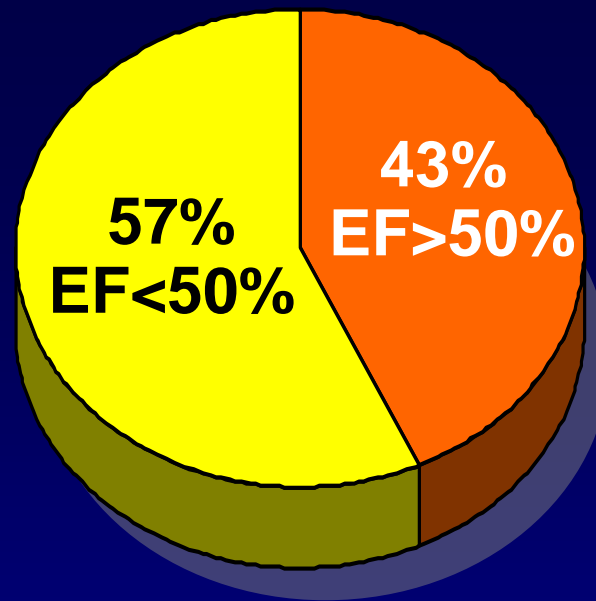
### **Prevalence of DHF among HF population**

- referral 45%**
- community 55%**

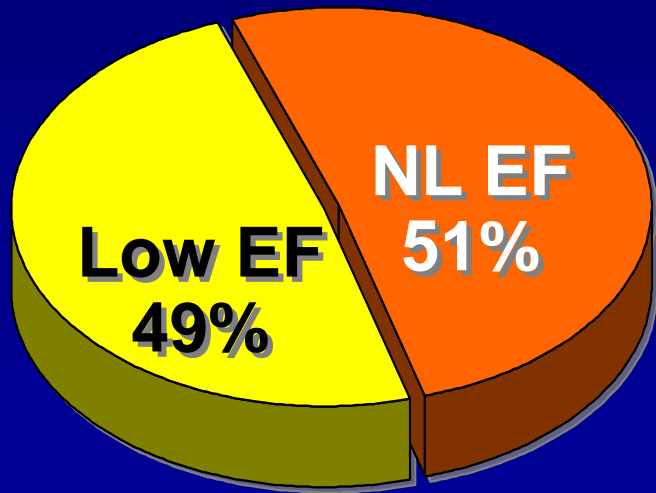
# Acute Diastolic HF in Registries



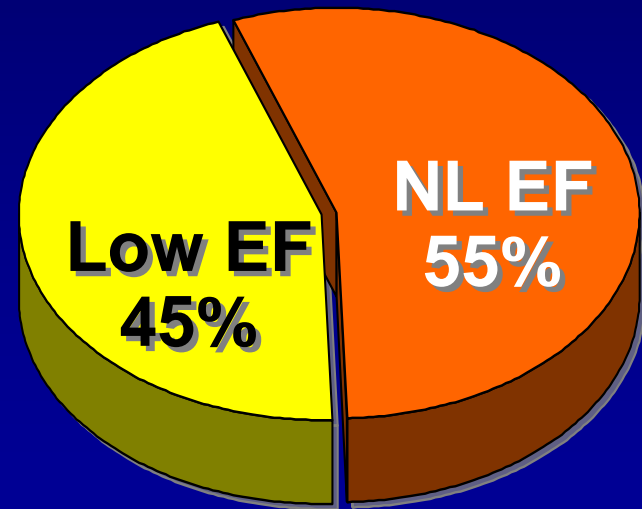
# Diastolic Heart Failure in the Community: Incident cases



Senni et al.  
*Circulation*  
1998

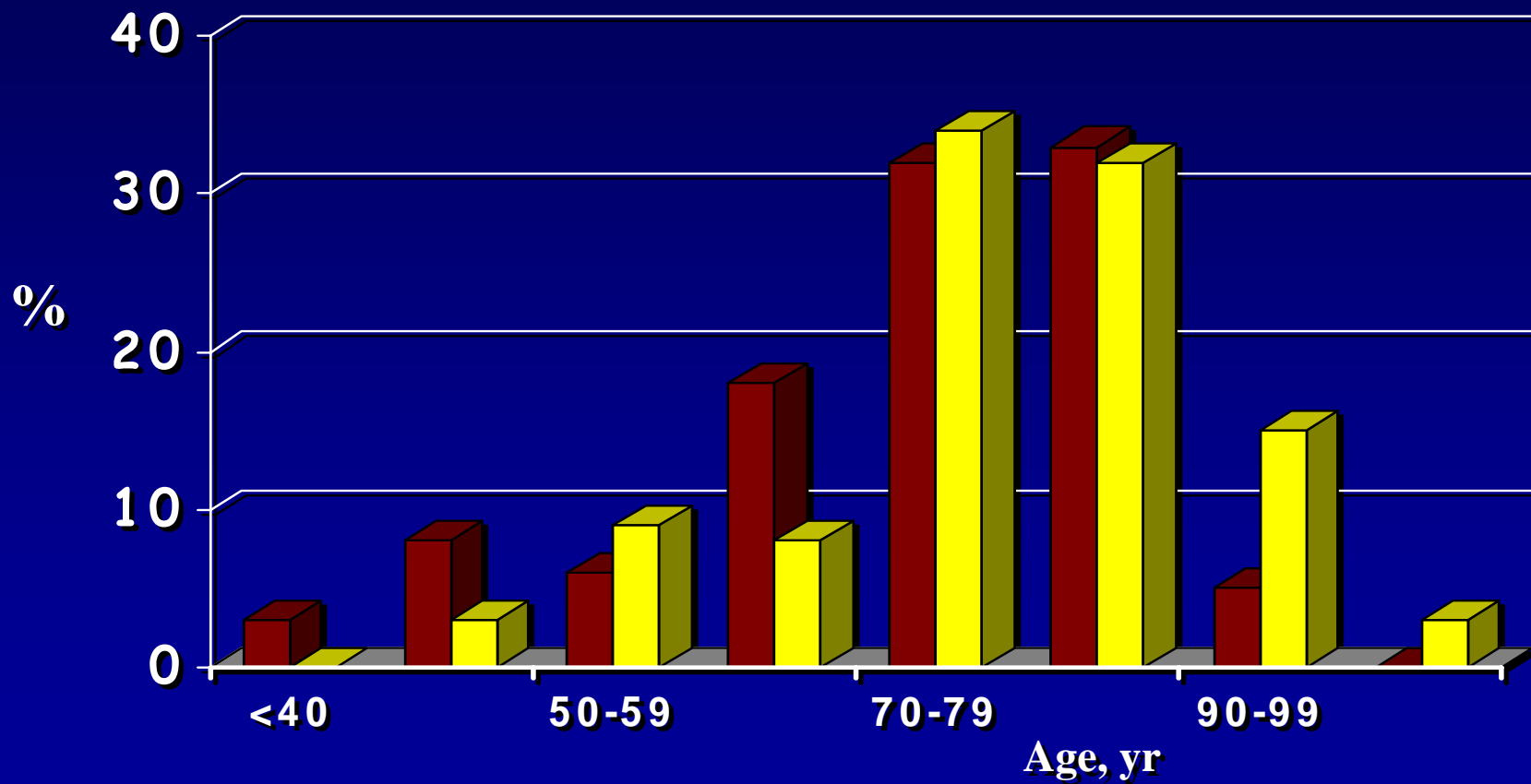


Vasan et al.  
*J Am Coll Cardiol*  
1999



Kitzman et al.  
*Am J Cardiol*  
2001

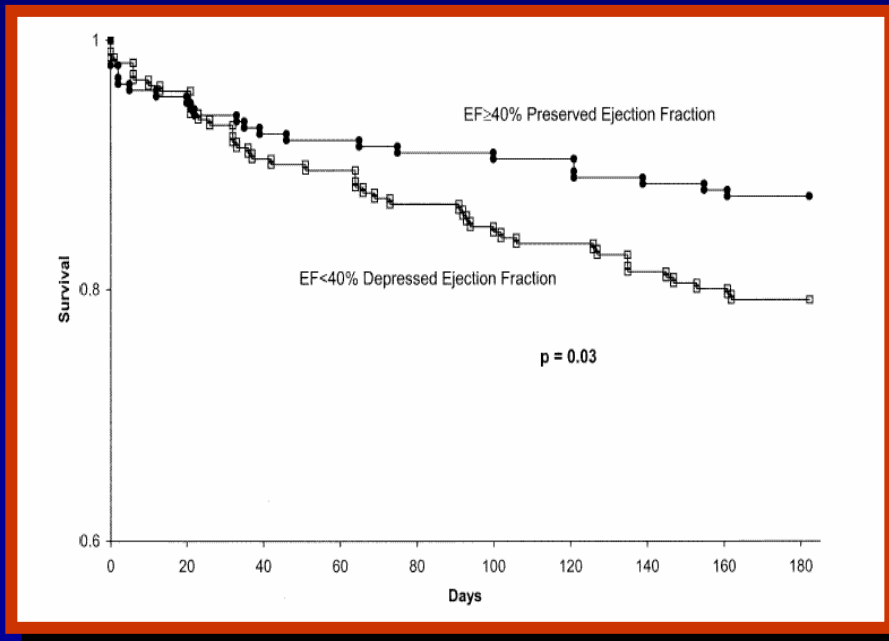
# Age distribution in patients with CHF



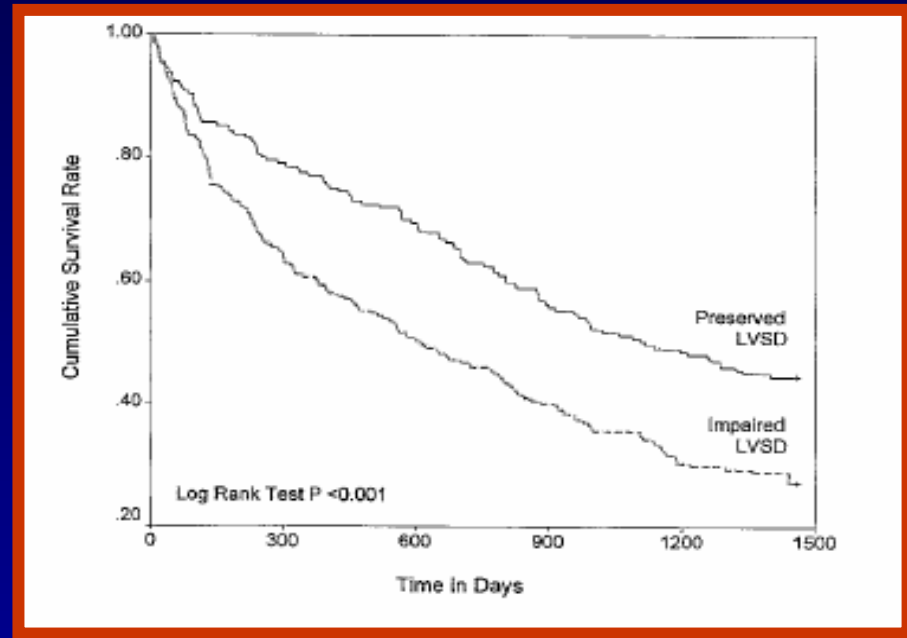
■ EF < 50%  
Mean age 74.2±13.3

■ EF > 50%  
Mean age 77.8±11.6

# Diastolic and Systolic HF: Better Prognosis

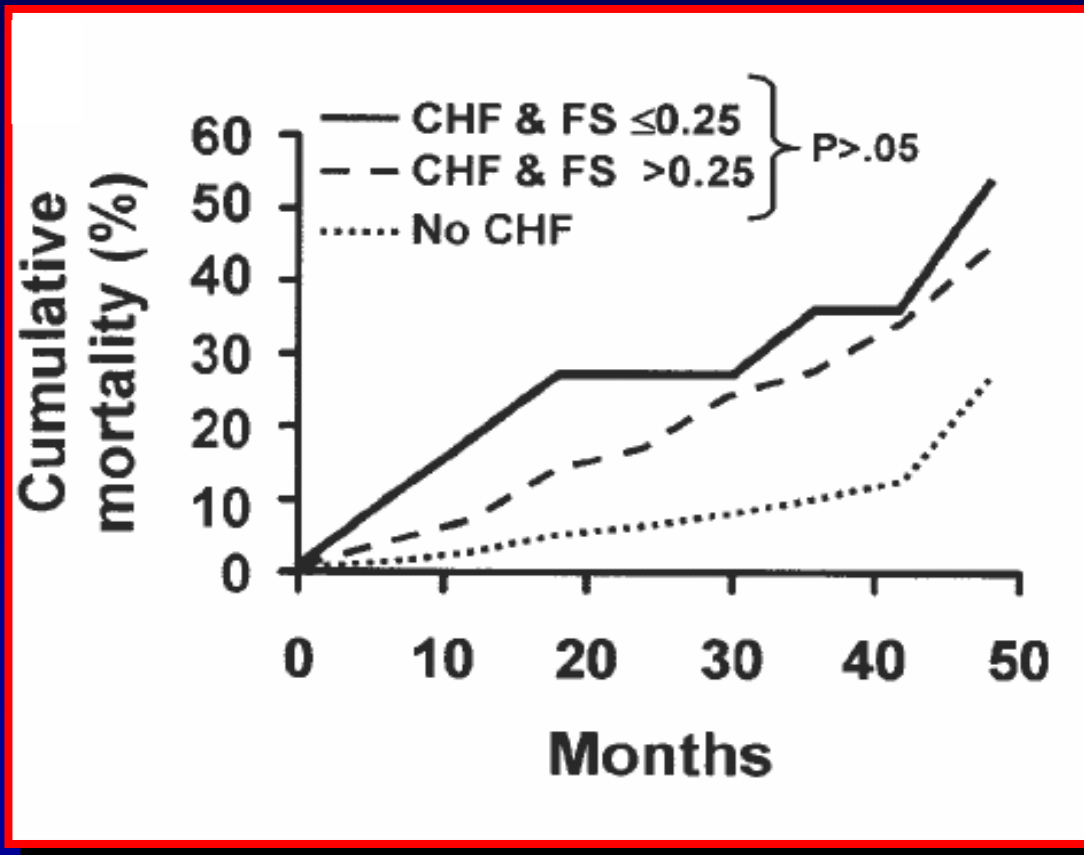


Smith GL et al. JACC 2003



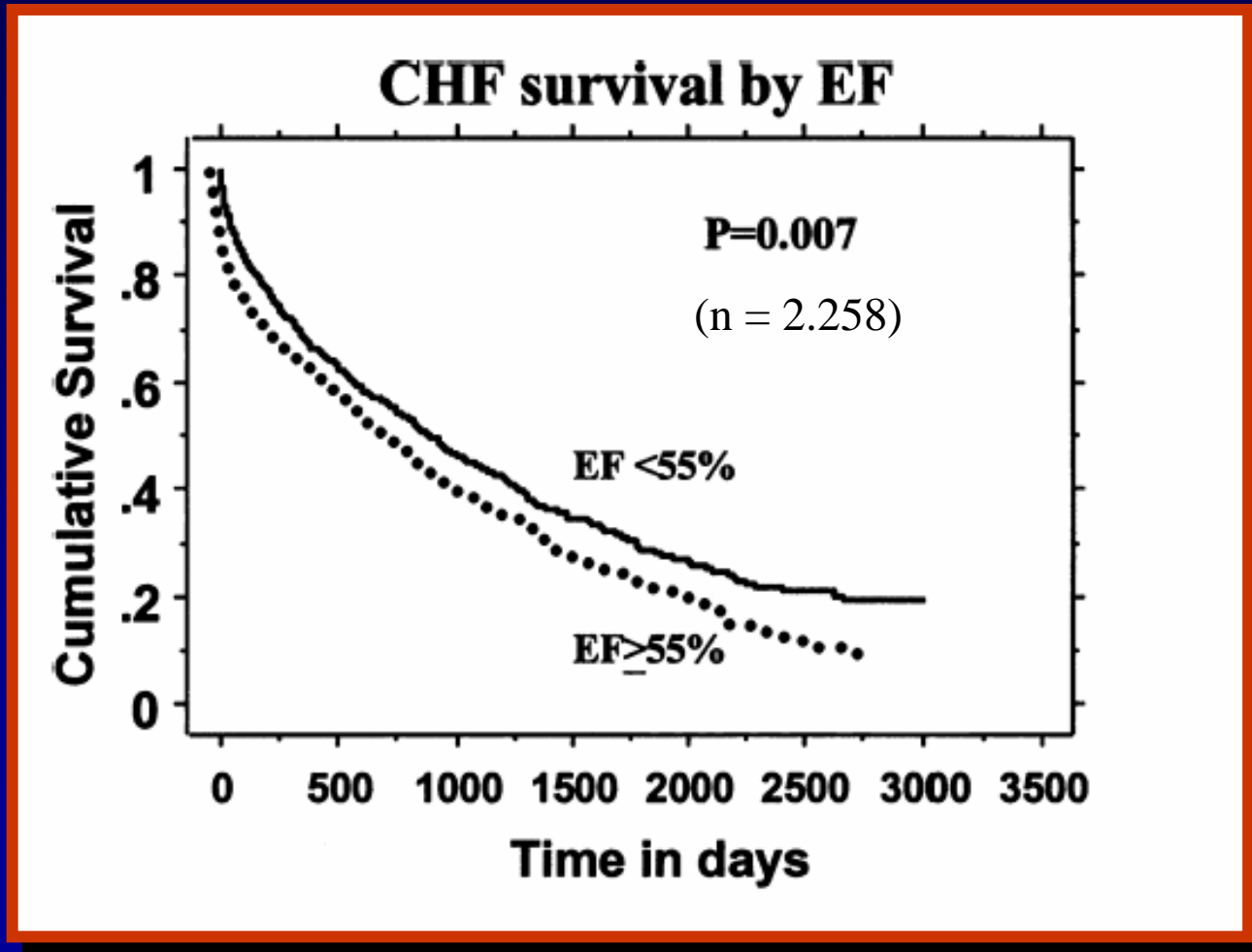
Ahmed A et al. Am Heart J 2002

# Diastolic HF and Systolic HF: Similar Prognosis



Kupari M et al. J Intern Med 1997

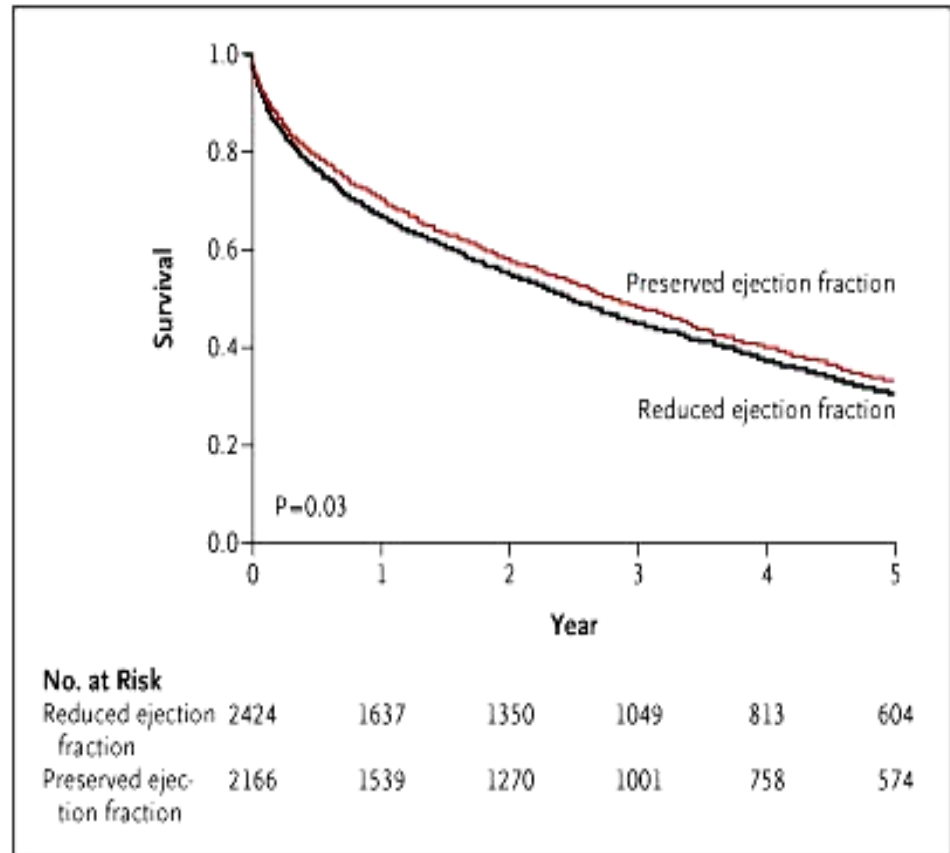
# Diastolic HF and Systolic HF: Worst Prognosis



# Why so different results?

- **Age of patients: different prognosis of DHF in elderly pts?**
- **Number of patients enrolled**
- **Choice of diagnostic criteria for CHF (enrolled pts with diagnosis of DHF without cardiac symptoms)**
- **Type of population studied (hospitalized, out-pts, echo lab, population-based)**
- **Incident or recurrent CHF**
- **EF evaluation: percentage of total population, timing, normal cut-off, methods**
- **Racial differences**

- ✓ All ages
- ✓ Population size (# 4596)
- ✓ High specific criteria (Framingham)
- ✓ Hospitalized
- ✓ Correct EF assessment

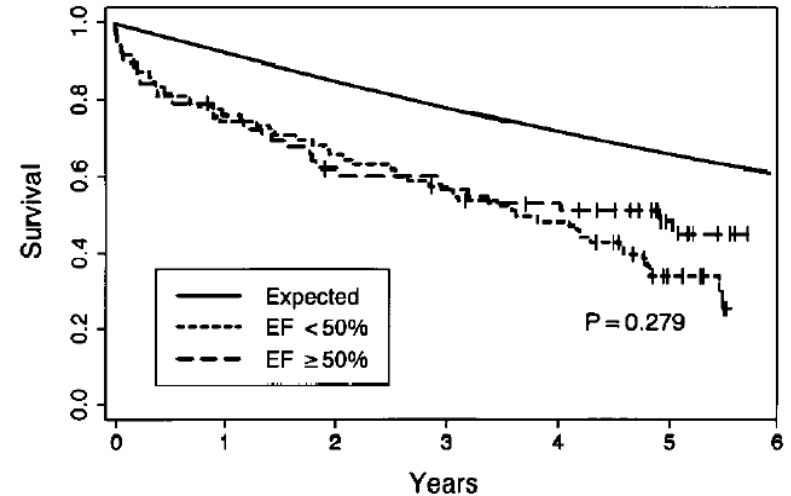


> 65 yo: HR 0.97, p = 0.06

# Incident cases

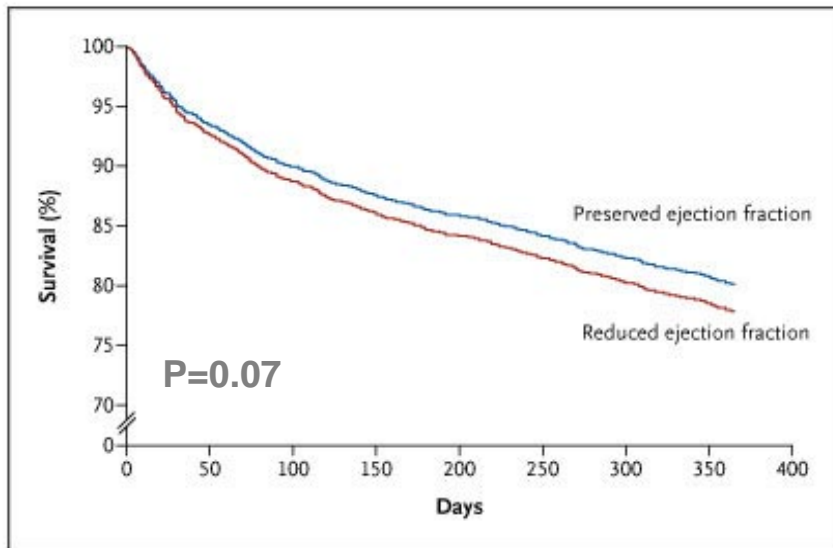


... from the same point in the evolution of the disease.



EF < 50%	78	58	51	44	36	16
EF ≥ 50%	59	44	35	32	29	15

Senni M et al. *Circulation*, 1998



Bathia RS et al. *NEJM*, 2006

## LIMITATION:

No study has assessed the cause of death in these elderly patients.

# Outcomes of Patients with Systolic and Diastolic Heart Failure

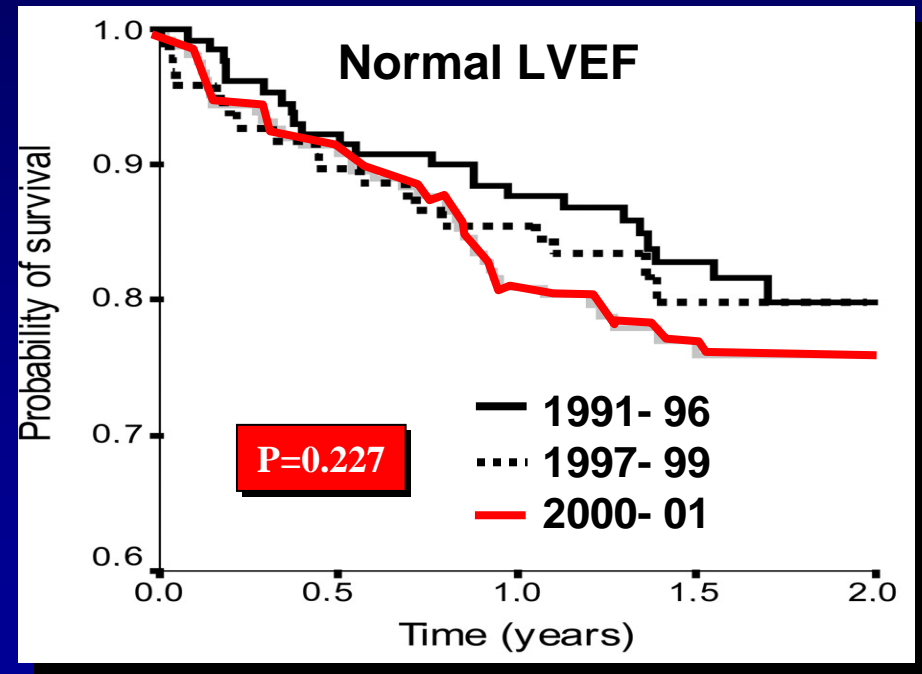
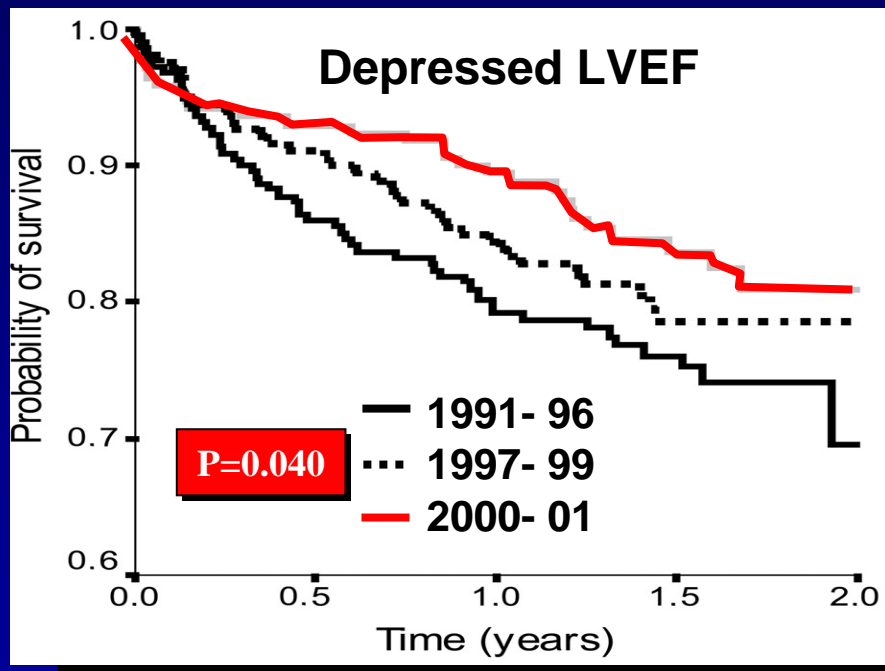
---

	<b>SHF (EF&lt;40%) (N=1570)</b>	<b>DHF (EF&gt;50%) (N=880)</b>	<b>p</b>
<i>30-D mortality</i>	112 (7.1%)	47 (5.3%)	0.08
<i>1-Yr mortality</i>	400 (25.3%)	195 (22.2%)	0.07
<i>30-D readmis. for HF</i>	73 (4.9%)	38 (4.5%)	0.66
<i>1-Yr readmis. for HF</i>	240 (16.1%)	114 (13.5)	0.09

---

# TEMPORAL TRENDS IN SURVIVAL

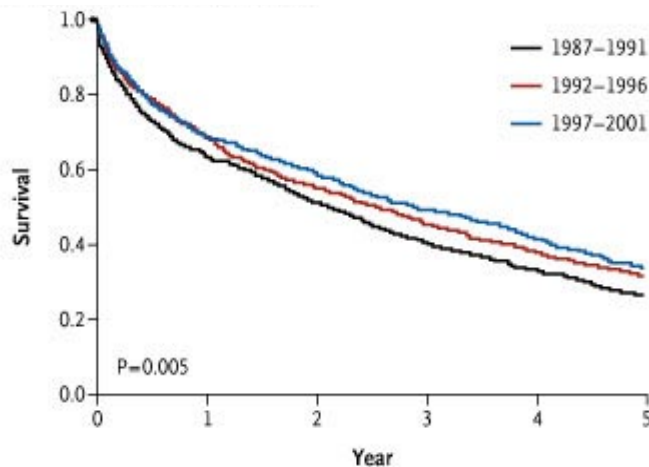
## Hospitalized patients



# TEMPORAL TRENDS IN SURVIVAL

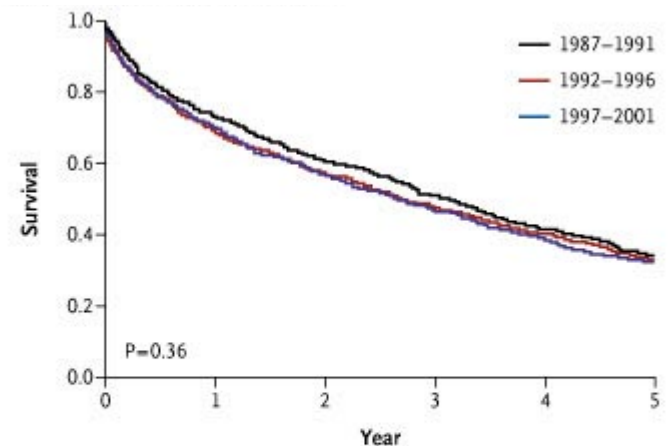
## Hospitalized patients

### Systolic HF (FE<50%)



No. at Risk	0	1	2	3	4	5
1987-1991	819	525	424	336	274	220
1992-1996	857	594	481	395	331	273
1997-2001	748	520	447	319	210	114

### Diastolic HF (FE≥50%)



No. at Risk	0	1	2	3	4	5
1987-1991	510	377	313	263	216	117
1992-1996	771	537	447	375	314	262
1997-2001	885	629	513	365	230	138

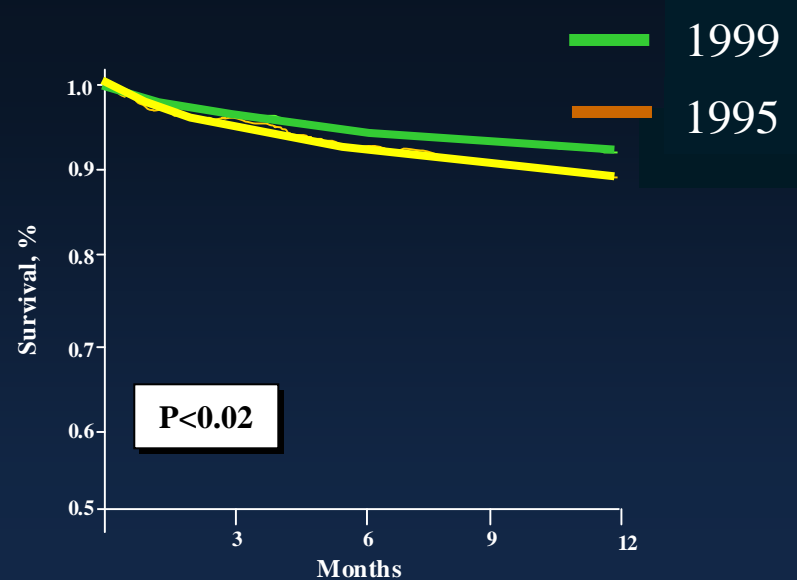
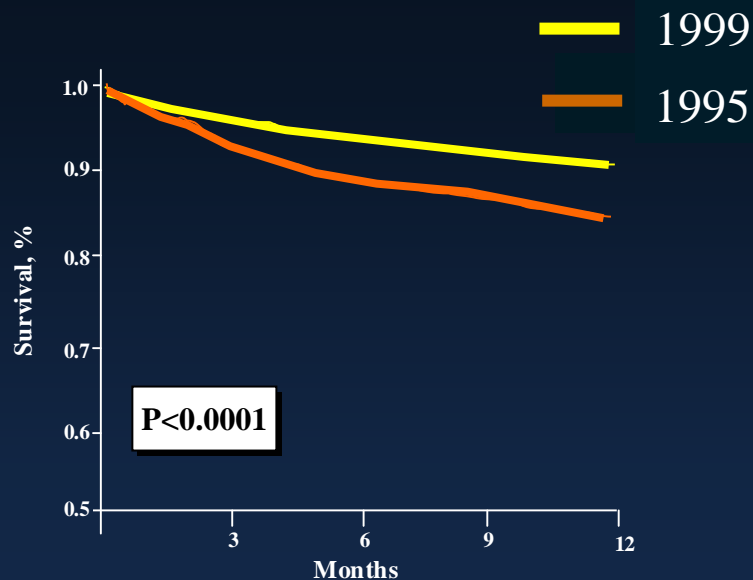
# TEMPORAL TRENDS IN SURVIVAL

## Outpatients

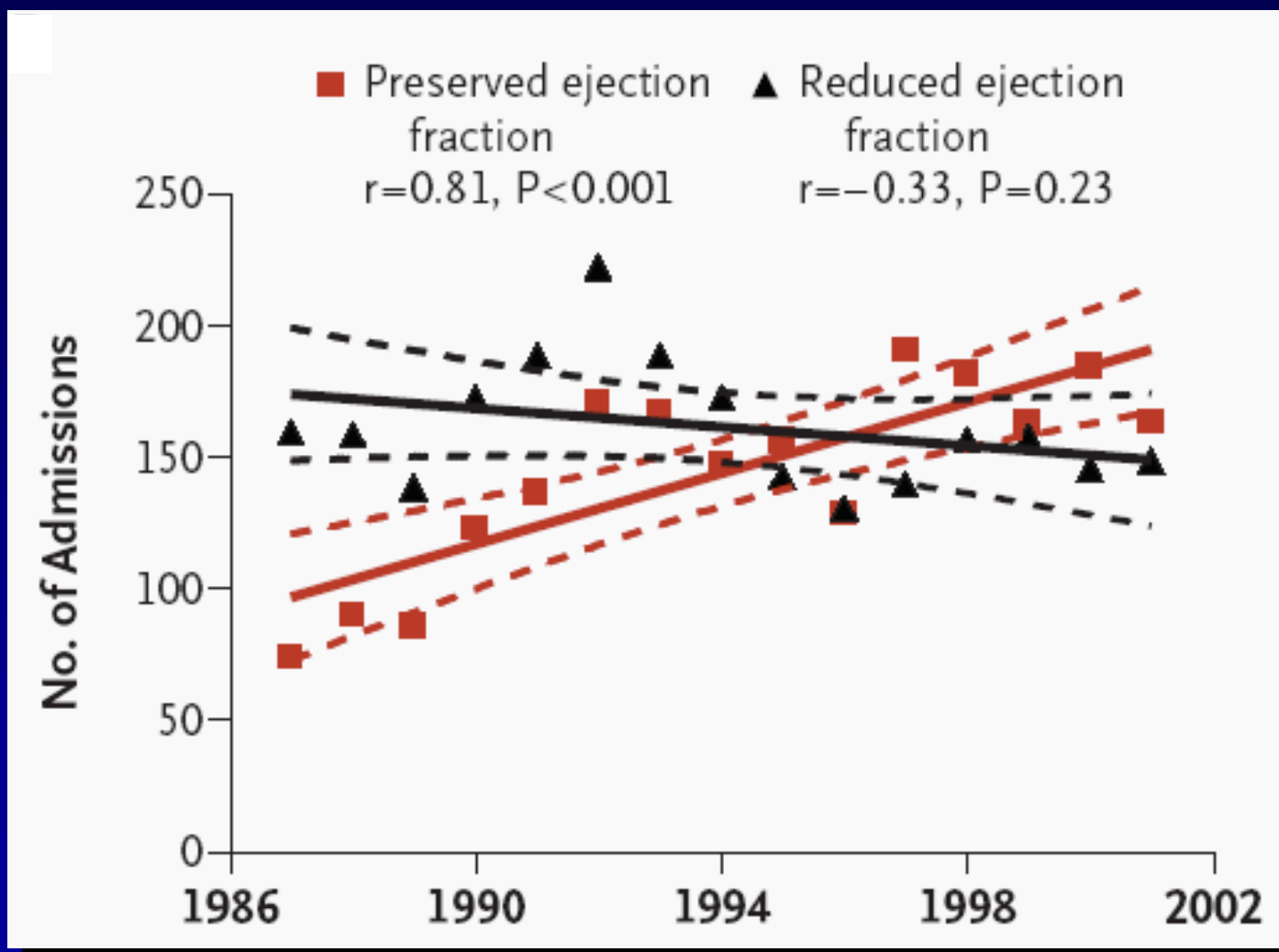
*The Italian Network on Congestive Heart Failure (IN-CHF)*

**Systolic HF (FE<40%)**

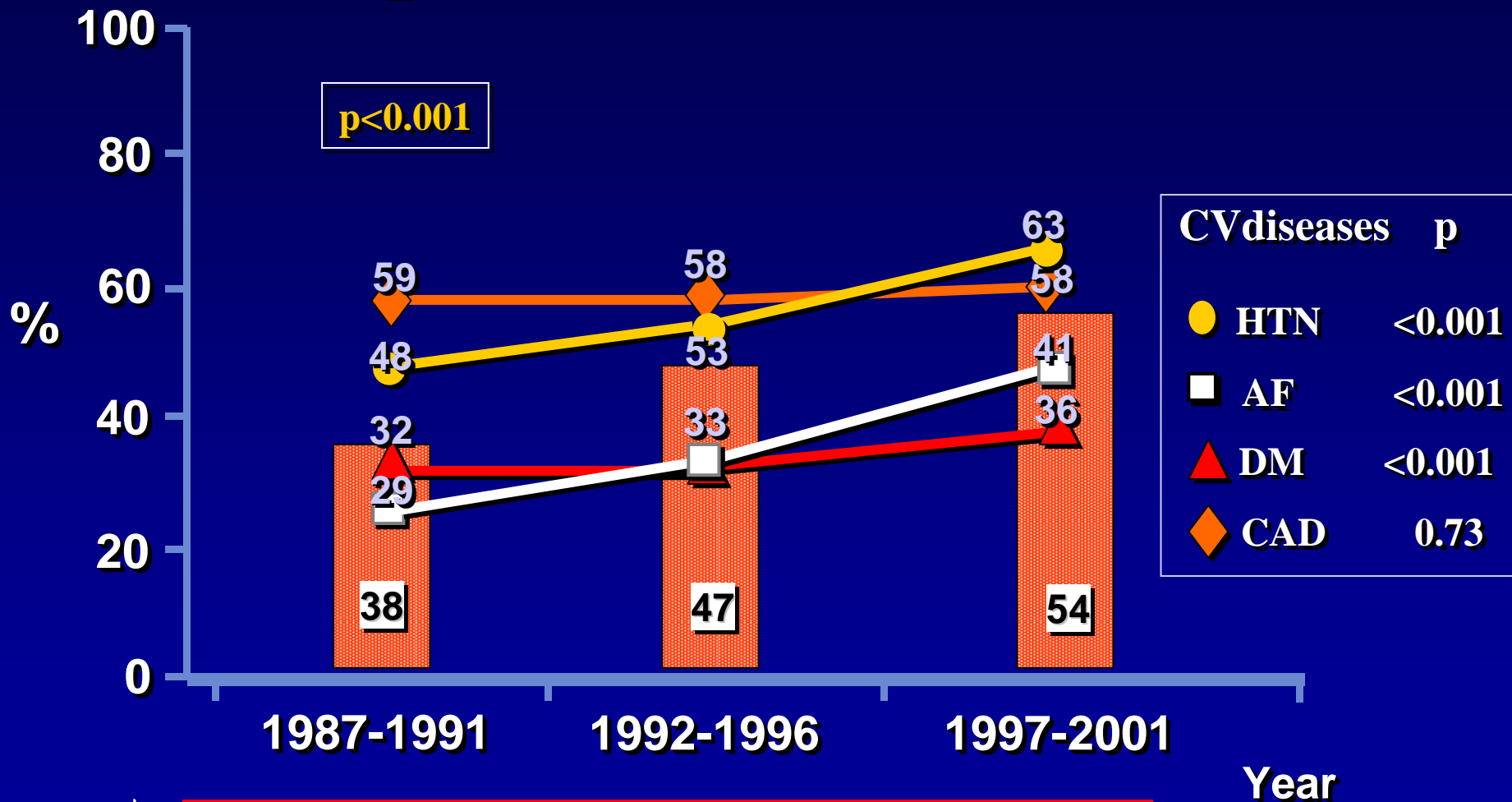
**Diastolic HF (FE<sub>≥</sub>40%)**



# TEMPORAL TRENDS IN THE PREVALENCE



# Secular Trends in the prevalence of DHF



Increased awareness of DHF in recent years.

# How Can We Decrease the Prevalence of DHF?

