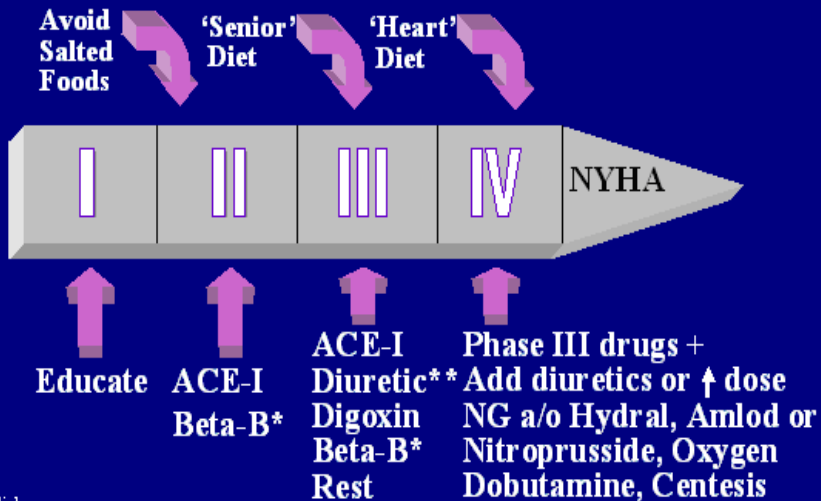«*Η διαχρονική παρακολούθηση της συστολικής λειτουργίας της ΑΚ έχει θέση στην κλινική παρακολούθηση ασθενών με καρδιακή ανεπάρκεια!*».

NYHA or
NYHA and ECHO

Heart Failure Management

				NYHA
Avoid Salted Foods	'Senior' Diet	'Heart' Diet		
I	II	III	IV	
Educate	ACE-I Beta-B*	ACE-I Diuretic** Digoxin Beta-B* Rest	Phase III drugs + Add diuretics or ↑ dose NG a/o Hydral, Amlod or Nitroprusside, Oxygen Dobutamine, Centesis	

NCSU Cardiology

	Definition	Disability
Class I	No limitation of physical exercise	No symptoms on ordinary activity
Class II	Slight limitation of physical activity	Symptoms on ordinary activity
Class III	Marked limitation of physical activity	Symptoms on less than ordinary activity
Class IV	Inability to carry out any physical activity without discomfort	Symptoms at rest

modern treatments: improved survival and reduced morbidity

but we are probably

seduced into a false sense of security

by benefits being presented as relative rather than absolute

differences.

NYHA I
No limitation

NYHA II
Slight limitation

NYHA III
Marked limitation

NYHA IV
Inability

ESC GUIDELINES

ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008[‡]

The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2008 of the European Society of Cardiology

routine assessment of EF at frequent, regular or arbitrary intervals **is not recommended**

ACCF/ASE/ACEP/ASNC/SCAI/SCCT/SCMR 2007 Appropriateness Criteria for Transthoracic Transesophageal Echocardiography*

routine use of echo **is inappropriate** once the patient has already been diagnosed with HF

2009 Focused Update: ACCF/AHA Guidelines for the Diagnosis and Management of Heart Failure in Adults

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

Class IIa

Repeat measurement of EF and the severity of structural remodeling can provide useful information in patients with HF who have had a change in clinical status

3.1. Initial Evaluation of Patients

The single most useful diagnostic test in the evaluation of patients with HF is the comprehensive 2-dimensional echocardiogram coupled with Doppler flow studies to de-

LVEF: preserved or reduced?

LV structure: normal or abnormal?

Valvular, Pericardial, RV abnormalities?

3.2. Ongoing Evaluation of Patients

During the initial and subsequent visits, healthcare providers should inquire about the type, severity, and duration of symptoms that occur during activities of daily [living] that may impair the patient's [...]

A variety of approaches have been used to quantify the degree of functional limitation imposed by HF. The most widely used scale is the NYHA functional classification

[...] asked about their participation in [...] sports or their ability to perform strenuous exercise, whereas patients with substantial limitations of activity should be asked about their ability to get dressed without stopping, take a shower or bath, climb stairs, or perform specific routine household chores. A useful approach is to ask patients to describe activities that they would like to do but can no longer perform, because changes in the ability to perform specific tasks are generally related to important changes in clinical status or course. Ideally, these inquiries should be coupled with direct observations of the patient during a walk around the clinic or up the stairs.

BUT...

NYHA   **most widely used**

But   interobserver variability

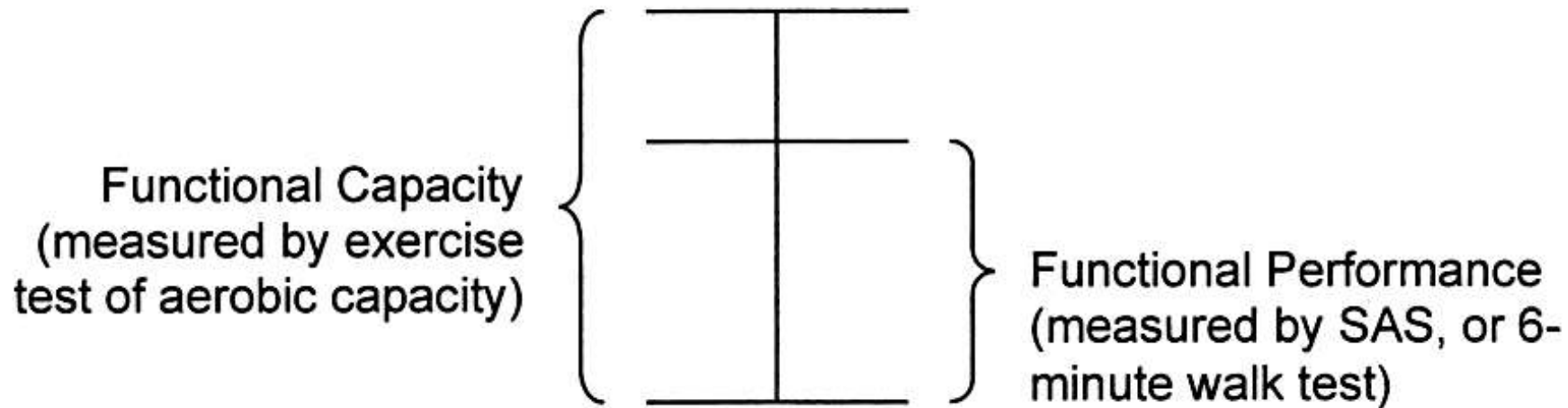   insensitive to changes in exercise capacity.

6 min walk: **prognosis _functional impairment**

But   serial changes in walking distance may not

   parallel changes in clinical status.

VO$_2$ MAX: **cardiac transplant _ exercise prescription**

But   management role in HF not defined.

clinicians have **assumed** that measures of the 2 concepts will be related in most patients

Functional Capacity (measured by exercise test of aerobic capacity)

Functional Performance (measured by SAS, or 6-minute walk test)

In **severely disabled** patients, functional performance on the 6-minute walk test may equal maximal aerobic capacity.

VO2 max exercise test of an **unmotivated** patient may measure functional performance rather than maximum capacity

This concept, called *functional status,* *varies not only* *because of* cardiac disease, but also because of

individual

perception of symptoms,

barriers in the environment,

assistance and social support,

psychological factors _depression.

1

patients rate NYHA **differently** from physicians,

women rate NYHA **differently** from men.

2

Pitfalls in the serial assessment of cardiac functional status. How a reduction in "ordinary" activity may reduce the apparent degree of cardiac compromise and give a misleading impression of improvement.

Goldman L, Cook EF, Mitchell N, Flatley M, Sherman H, Cohn PF.

3

**Sleep Apnea
Pulmonary Disorders
Depression
Anemia
Thyroid**

4

patient self-report of symptoms
is inherently unreliable

5

poor correlation between the severity of cardiac dysfunction and exercise capacity.

Self-assessed symptoms in chronic heart failure — Important information for clinical management

6

insensitive to changes in exercise capacity

considerable interobserver variability.

Clinical study

Lack of correlation between exercise capacity and indexes of
resting left ventricular performance in heart failure

treatment decisions such as

spironalactone,
hydralazine /nitrates,
implantable cardioverter defibrillator (ICD),
chronic resynchronization therapy (CRT)

are often based on NYHA class, and patients who may benefit from treatment based on declining EF may not be granted access to this therapy.
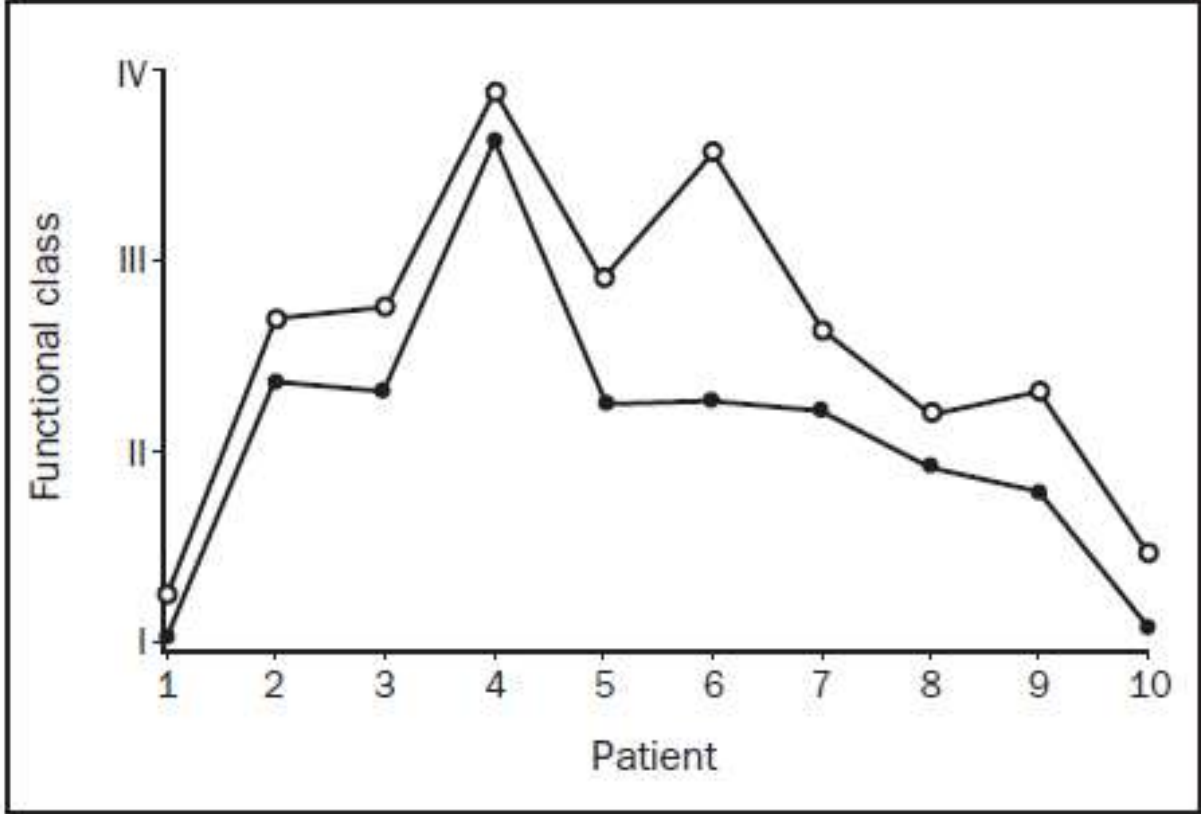
Since NYHA functional class is a subjective tool, it is not surprising that what is judged as **"undue dyspnea"** or **"ordinary activity"** may **differ widely among clinicians** assessing NYHA/WHO functional class.

LVEF< 40%
annual echocardiograms
not based on any change
in clinical symptoms.

1124 with a diagnosis of heart failure

3-month intervals, routine office visits with a cardiologist

Education including viewing a 12-min video on HF management

Self-management of volume status using diuretics

ACE inhibitor/b-blocker titrated to maximal tolerated dosages

ECG+ECHO before treatment and then annually

Clinical+ Biochemical at baseline

Died or **lost to follow up**

Stress echo/Nuclear/Angio=ischemic HF

Simpson's EF. Improvement: **LVEF >5%** baseline to follow up

	First Assessment N=256	Second Assessment N=256	P Value
Age, mean (SD)	55.13 (13.8)	55.13 (13.8)	
Male, No. (%)	168 (65)	168 (65)	
LVEF, mean±SD	35.4±12.8	37±12.31	.14
NYHA, mean (SD)	2.21 (0.94)	2.11 (0.81)	.18
NYHA			.13
Class 1, No. (%)	72 (27.6)	66 (23.7)	
Class 2, No. (%)	92 (31.4)	127 (45.5)	
Class 3, No. (%)	73 (32.8)	74 (26.5)	
Class 4, No. (%)	19 (8.3)	12 (4.3)	
Education, mean (SD)	9.53 (3.13)	9.44 (3.14)	.96
ICM, No. (%)	56 (24.4)	56 (24.4)	
BMI, mean (SD)	32.28 (8.60)	33.12 (8.18)	.222
Diastolic blood pressure, mean (SD)	76.0 (16.2)	74.03 (16.00)	.16
Systolic blood pressure, mean (SD)	131.24 (26.2)	128.17 (24.98)	.17
β-Blocker, No. (%)	222 (95.6)	276 (97.87)	.774
ACE inhibitor, No. (%)	219 (94)	267 (94.68)	.210

Abbreviations: ACE, angiotensin-converting enzyme; BMI, body mass index; ICM, ischemic cardiomyopathy; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association; SD, standard deviation.

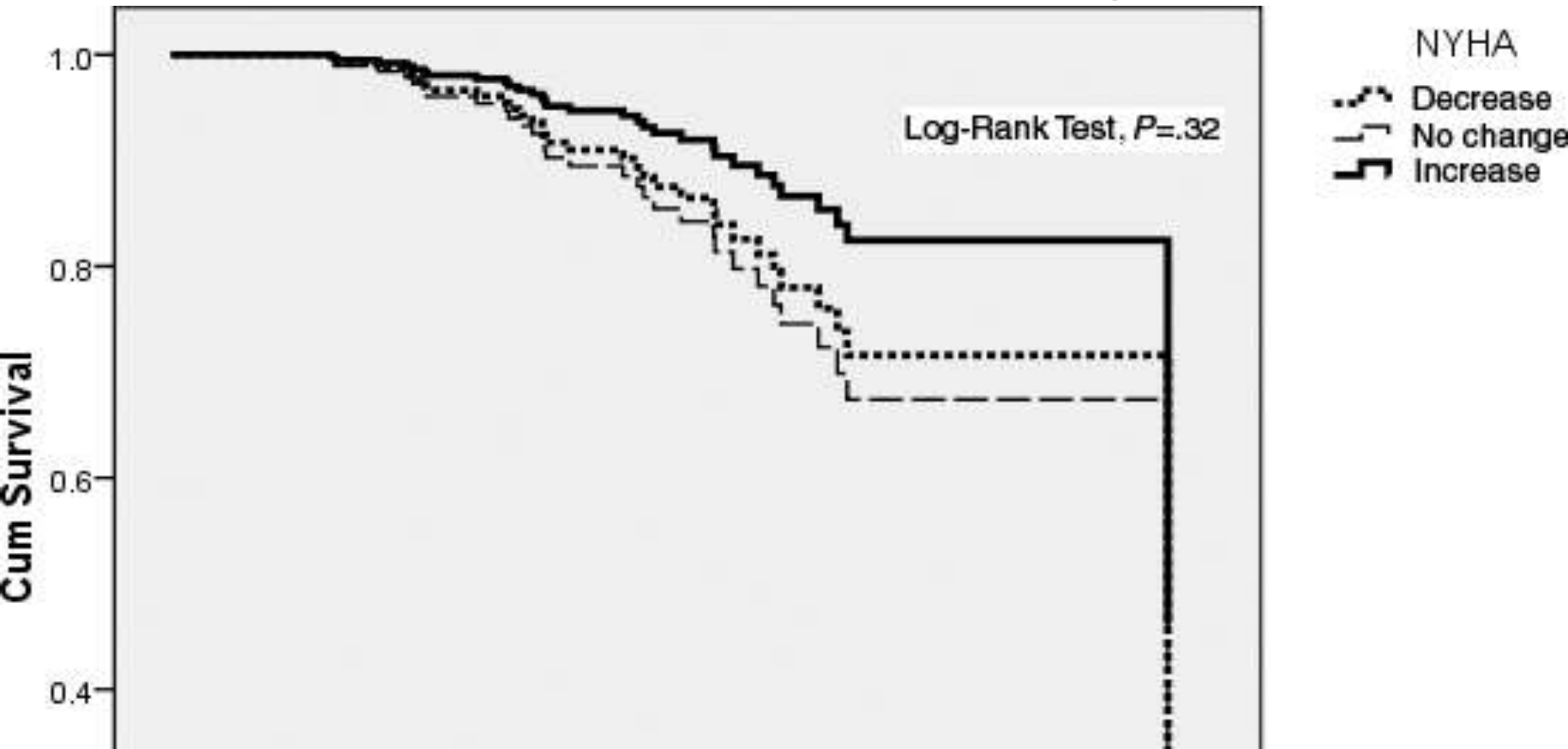**Table II.** Changes in NYHA Class and in EF Between Echocardiographic Assessments

	Decrease in EF, No. (%)	No Change in EF, No. (%)	Increase in EF, No. (%)

Only 86 of 256 **(33.5%)** pts **were correctly classified** by NYHA class as showing improvement, no change, or deterioration.
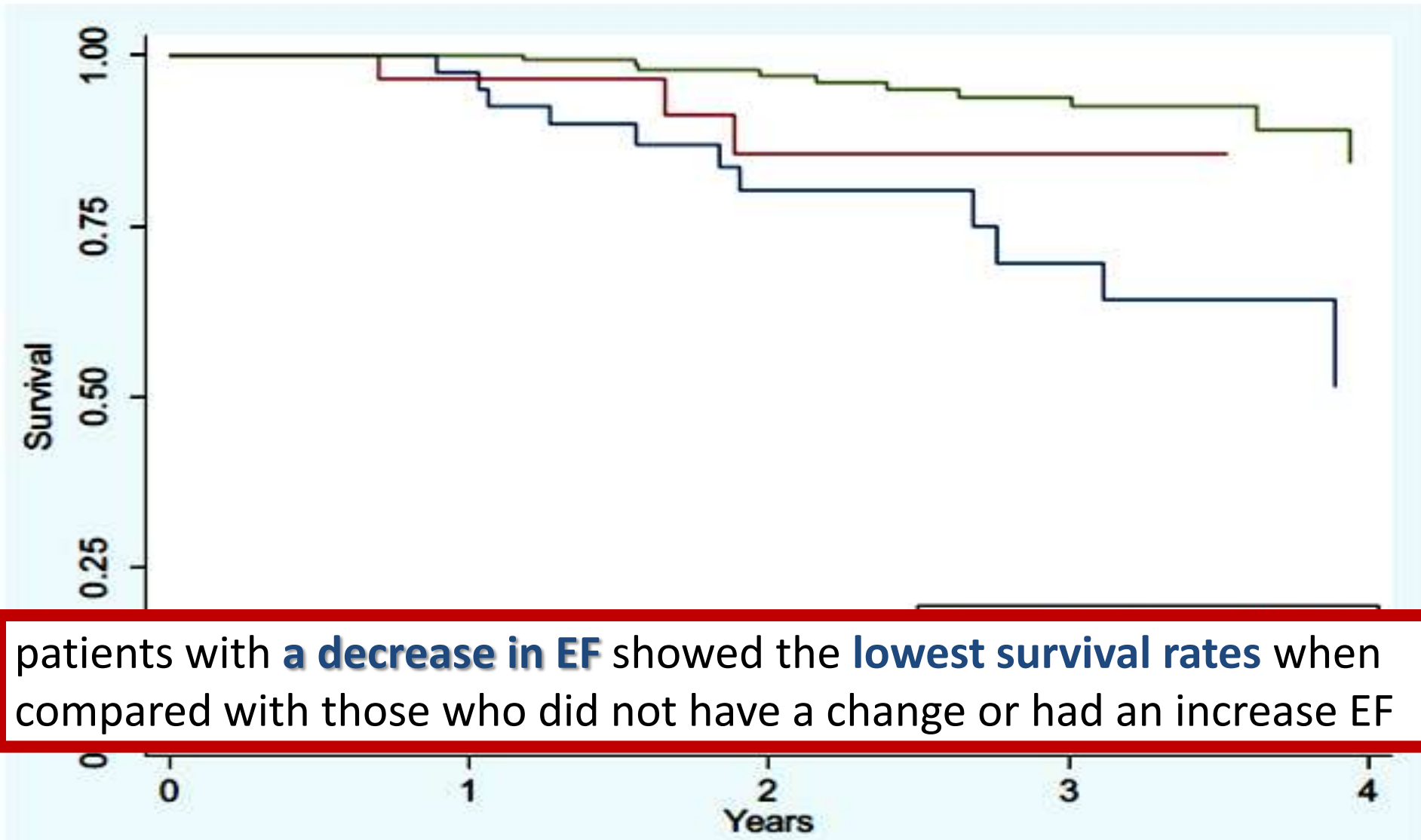
NYHA vs Mortality

no significant difference in terms of **survival rates** among the 3 groups.

LVEF vs Mortality.

patients with **a decrease in EF** showed the **lowest survival rates** when compared with those who did not have a change or had an increase EF

Figure 3. Kaplan-Meier survival curve for change in ejection fraction (EF), log-rank <.01.

LVEF decrease	**LVEF increase**
Eligible **For ICD** but, without change in NYHA clinicians lack any means to determine this change in LVEF.	**No longer candidates** **For ICD** expensive technology and all the potential Complications and Costs to both patient / society.

1/600

ICD

$ 25,000

NOT including lead or pocket infections!

ECHO

$ 425

free of complications!

After The Diagnosis Of HF

37% decreased LVEF
missed by NYHA class
Potentially benefit from ICD/CRT

6% increased LVEF
missed by NYHA class
Potentially cost saving from ICD/CRT

ELSEVIER

Comparison of different methods of functional evaluation in patients with chronic heart failure

even with a discrepancy between NYHA and EF, current ACC/AHA guidelines for HF are based on **NHYA classification follow-up** rather than an **objective measure** such as routine echo to quantify LV function.

ACC/AHA guidelines questioned in regards to the level of evidence used

54.3% of studies had level of evidence C !

Even for class I recommendations!

15.5% were articles with **level of evidence A**
25.6% were articles with **level of evidence C**

Routine Serial Echocardiography in Systolic Heart Failure:

Is It Time for the Heart Failure Guidelines to Change?

50 Years old male

Smoker and super type A

Anterior AMI → LAD PCI (2003)

Stopped Smoking- On Rx But

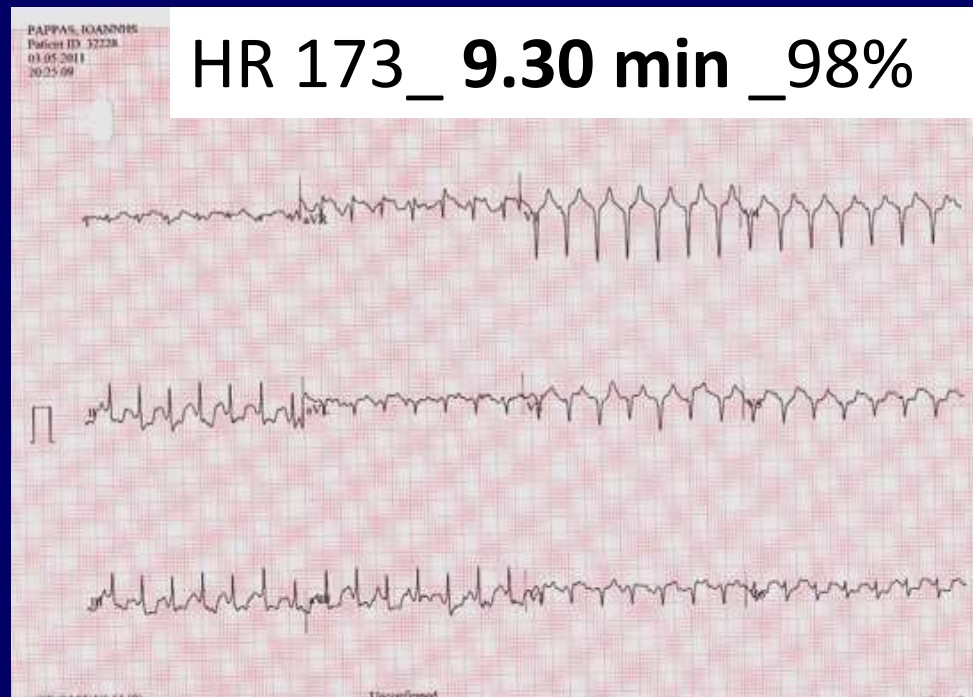Angina plus troponin 6 months later (2003)

LAD PCI again

Since then **Asymptomatic_NO** medication at all!

Hospital Doctors Insisted on ICD
For Prognostic Reasons

LVEF=33%

ETT?

HR 173_ **9.30 min** _98%

ευχαριστώ

CHF predictors of mortality

NYHA

LVEF

WMSI

Low LVEF → higher risk for

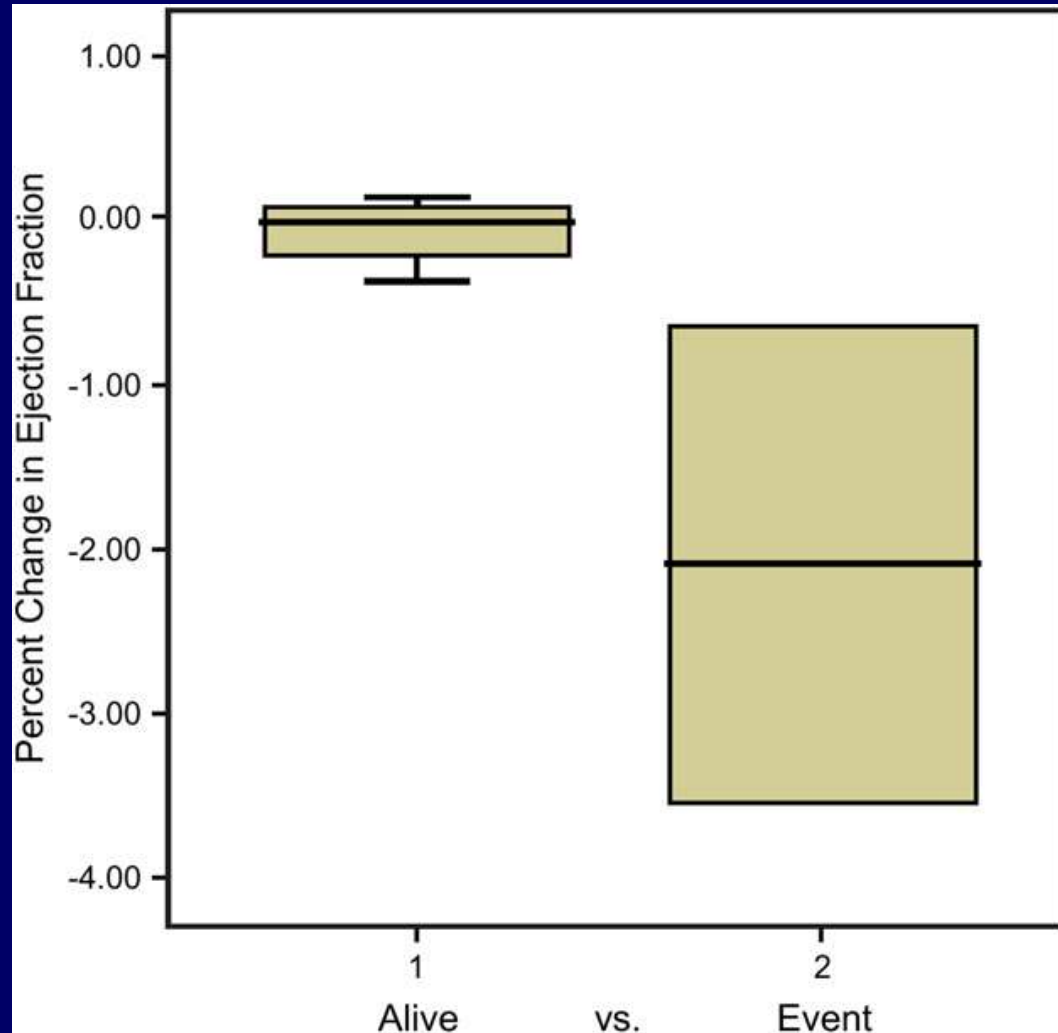sudden cardiac death

stroke

MI

heart transplant

data regarding the predictive value of serial echo in clinical outcome measures for CHF are limited.

Int J Cardiol 2003
Am J Cardiol 2000
JACC 1997
Circulation 1994

decrease in LVEF between initial echo and follow-up echo in those with and without event outcomes.

There has been **no established role** for periodic invasive or noninvasive measurements in the management of HF.

drugs used for the treatment of HF are given on the basis of their ability to improve **symptoms or survival** rather than their effect on hemodynamic variables.

the initial and target doses of drugs are selected on the basis of **experience in controlled trials** and are not based on the changes they may produce in CO/ PCWP.

Symptoms reflect the patient's personal subjective experience, which is then interpreted, subjectively, by health professionals

TABLE 2. **Factors Clinicians Considered When Formulating Functional Class Assessments**

	Paper	Online	P value
Symptoms	41 (93)	68 (99)	.13
Medication used	10 (23)	17 (25)	>.99
Hemodynamic values	11 (25)	0	<.001
Physical examination	24 (55)	31 (45)	.34
6-minute walk distance	18 (41)	41 (59)	.08
Echocardiographic findings	8 (18)	0	<.001
Patient's lifestyle	33 (75)	46 (67)	.40
Patient's occupation	23 (52)	31 (45)	.56
Insurance requirements	9 (20)	0	.01

3.2.2. Assessment of Volume Status

1   **body weight**

2   **blood pressure** sitting and standing

3   Degree(?)**jugular distension/r**esponse(?) **abdominal pressure**

4   presence-severity(?) of **organ congestion**(rales/hepatomegaly),

5   magnitude of **peripheral edema** (legs,presacral,scrotum, ascites)

The most reliable sign of volume overload is jugular venous distention (59–61). Right-sided filling pressures are

LV Filling and Prognosis

In the normal heart, the transmitral vortex assists in the effective transfer of volume, momentum, and energy5,12 from the left atrium to the aorta via the left ventricle (LA) and minimizes the stroke work

A. Early Diastolic Vortex Formation

B. Mid Diastolic Vortex Formation

C. Late Diastolic Vortex Pinch-off

D. Isovolumic Vortex Rotation

E. Systolic Vortex Translation

Clinical Significance

Great heterogeneity exists among results in the prognosis of diastolic dysfunction,[38] which clearly emphasizes the importance of the evaluation of LV diastolic characteristics in clinical research. Two important studies revealed the prognostic value of grading diastolic dysfunction.[39,40] The Progetto Ipertensione Umbria Monitoraggio Ambulatoriale (PIUMA) study[39] showed that the pattern of abnormal relaxation increased the risk for cardiovascular events during 11-year follow-up.

The Strong Heart Study,[40] during 3-year follow-up in a population of 3,008 American Indians, showed that an abnormal relaxation pattern is associated with a twofold increase in mortality risk, while pseudonormal and restrictive patterns are associated with a threefold increase in cardiac mortality. These results are also consistent with the findings of the Framingham Heart Study.[40]

In consideration of these findings and combining the value of the prognostic studies, VFT index as a single index that differentiates the stages of diastolic dysfunction would be extremely useful in clinical follow-up and potentially in the assessment of response to treatment in the future. The results of the present work may provide an important step forward in the evaluation of diastolic function and determination of the disease prognosis.

Prognostic Significance of Left Ventricular Diastolic Dysfunction in Essential Hypertension

Giuseppe Schillaci, MD,* Leonella Pasqualini, MD,* Paolo Verdecchia, MD, FACC,†
Gaetano Vaudo, MD,* Simona Marchesi, MD,* Carlo Porcellati, MD,† Giovanni de Simone, MD,
Elmo Mannarino, MD*

Our results have shown that **37%** of patients screened with regular echocardiograms had a **decrease in EF** and this reduction in EF not identified by NYHA class would have been missed if these patients were not part of an annual echocardiogram protocol.

These patients could potentially benefit from **ICD∕CRT** implant.

Mitral Ratio of Peak Early to Late Diastolic Filling Velocity as a Predictor of Mortality in Middle-Aged and Elderly Adults
The Strong Heart Study

Jonathan N. Bella, MD; Vittorio Palmieri, MD; Mary J. Roman, MD; Jennifer E. Liu, MD;
Thomas K. Welty, MD, MPH; Elisa T. Lee, PhD; Richard R. Fabsitz, MA;
Barbara V. Howard, PhD; Richard B. Devereux, MD

NYHA classes measure *comparative symptomatology* at a given level of performance, defined as an individual's ability to do activities within his or her regular milieu—an ability that may be limited by a variety of personal, environmental, or social factors, including symptoms.[19,20]

Functional status is a critically important concept for understanding the impact of CVD on the day-to-day life of patients, but it is **difficult to measure because it is broad and subjective.**

If the NYHA classes are a valid measure of functional status, the classes must measure the functional status of the patient and discriminate functional status from the purely physical concepts of functional capacity and performance.

morbidity, but we are probably

seduced into a false sense of security

by benefits being presented as relative rather than absolute

differences.
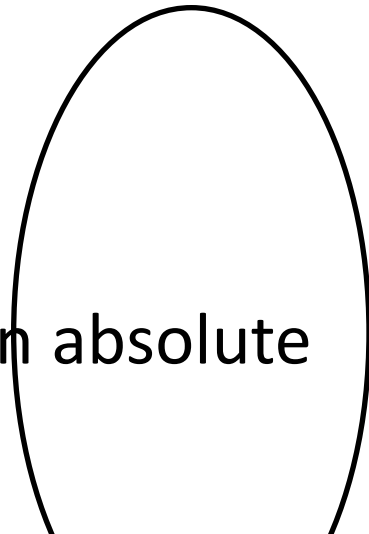
| Class IV | Inability to carry out any physical activity without discomfort | Symptoms at rest | |

modern treatments: survival+   morbidity--

relative reduction in events of 30%

absolute change of say 5–7%

LVEF / degree of HF are well known determinates of **survival** in patients with cardiomyopathy

It is also known that changes in echocardiographic measurements in response to therapy may not relate to change in symptoms or exercise tolerance

JASE   2004;17
Circulation   1997;95
Heart Fail Rev.   2003;8

NYHA

NEW YORK HEAVY ARTILERY

Our results have shown that **37%** of patients screened with regular echocardiograms after the diagnosis of HF had a **decrease in EF** and this reduction in EF not identified by NYHA class would have been missed if these patients were not part of an annual echocardiogram protocol. These patients could potentially benefit from **ICD ∕ CRT** implant.

In 147 patients, **6%** had an **increase in EF** that was seen even with a decline or no change in NYHA class. In this group, the benefits would trend to cost-saving measures where the use of expensive treatments would be no longer needed.