Heart Failure Management

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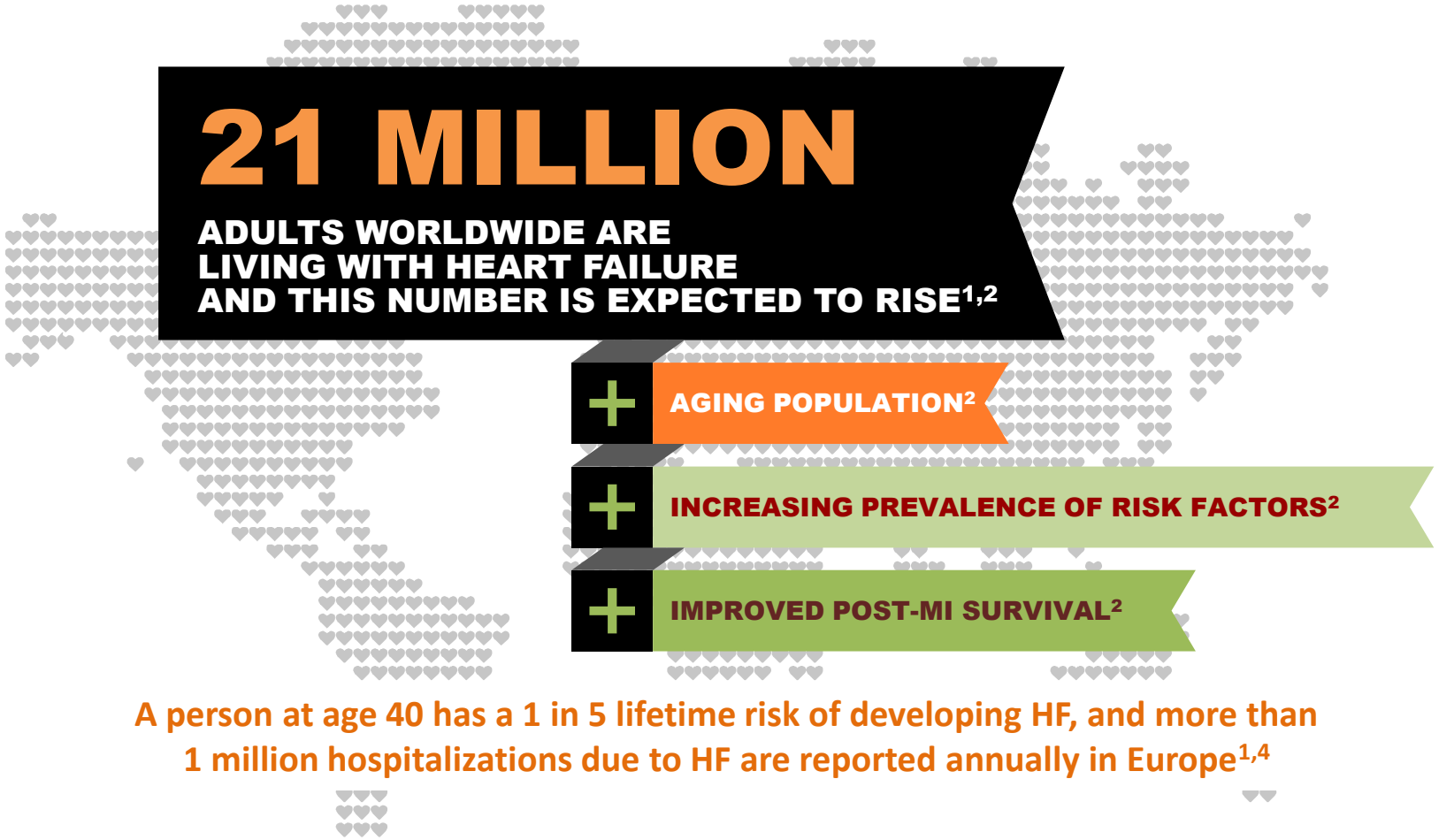
Heart failure prevalence is expected to continue to increase[1]



A person at age 40 has a 1 in 5 lifetime risk of developing HF, and more than 1 million hospitalizations due to HF are reported annually in Europe[1,4]

HF=heart failure; MI=myocardial infarction

1. Mozaffarian et al. Circulation 2015;131:e29–e322. 2. Mosterd and Hoes. Heart 2007;93:1137–46. 3. Velagaleti and Vasan Epidemiology of heart failure. In: Mann, ed. Heart Failure: A Companion to Braunwald's Heart Disease. 2nd ed. St Louis: Saunders; 2011. 4. Ponikowski et al. ESC Heart Failure 2014;1:4–25

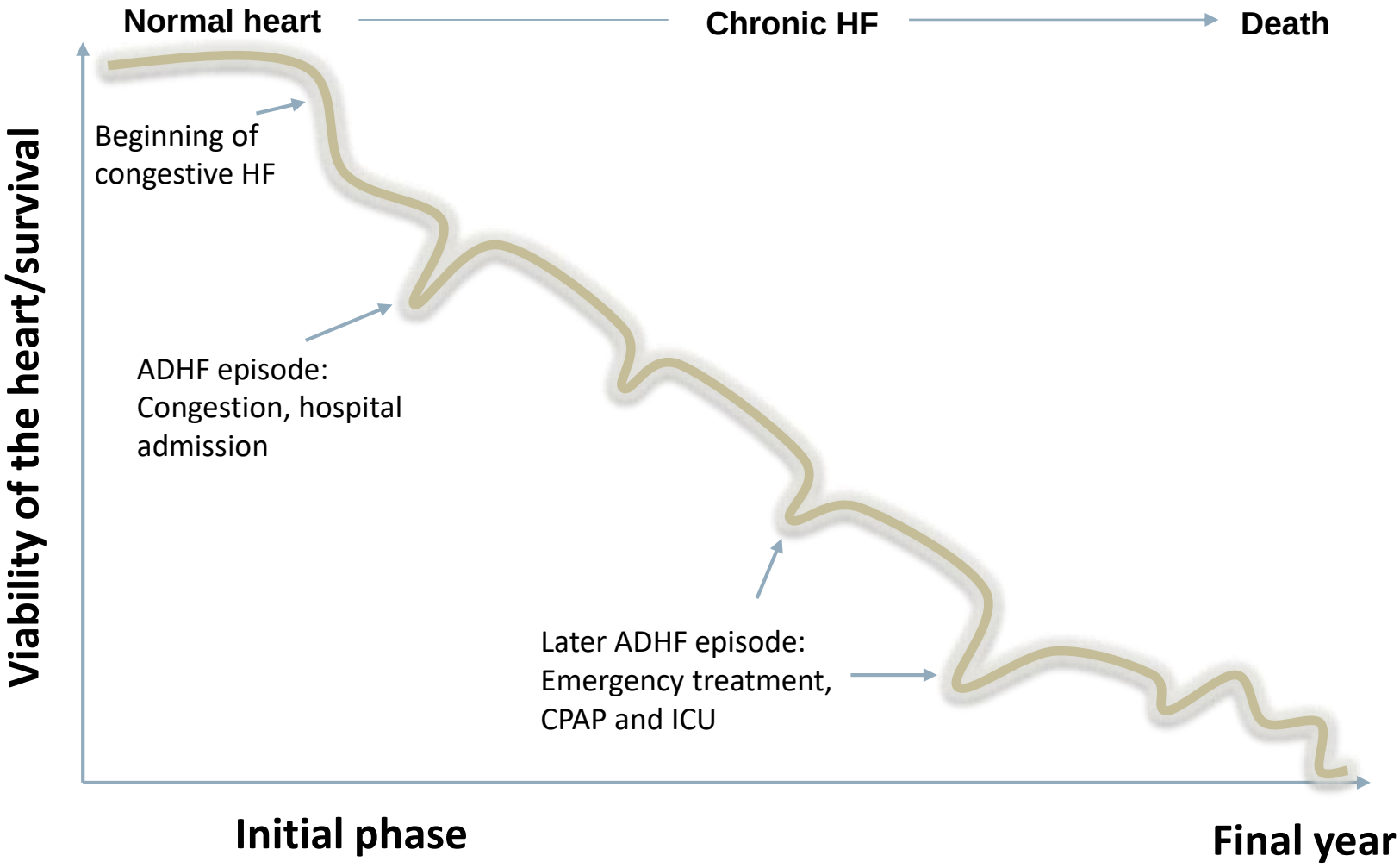
HF is associated with high mortality rates

~50% OF PATIENTS DIE WITHIN 5 YEARS OF DIAGNOSIS[1]

~1 IN 4 HF PATIENTS DIE WITHIN 1 YEAR OF DIAGNOSIS[2]

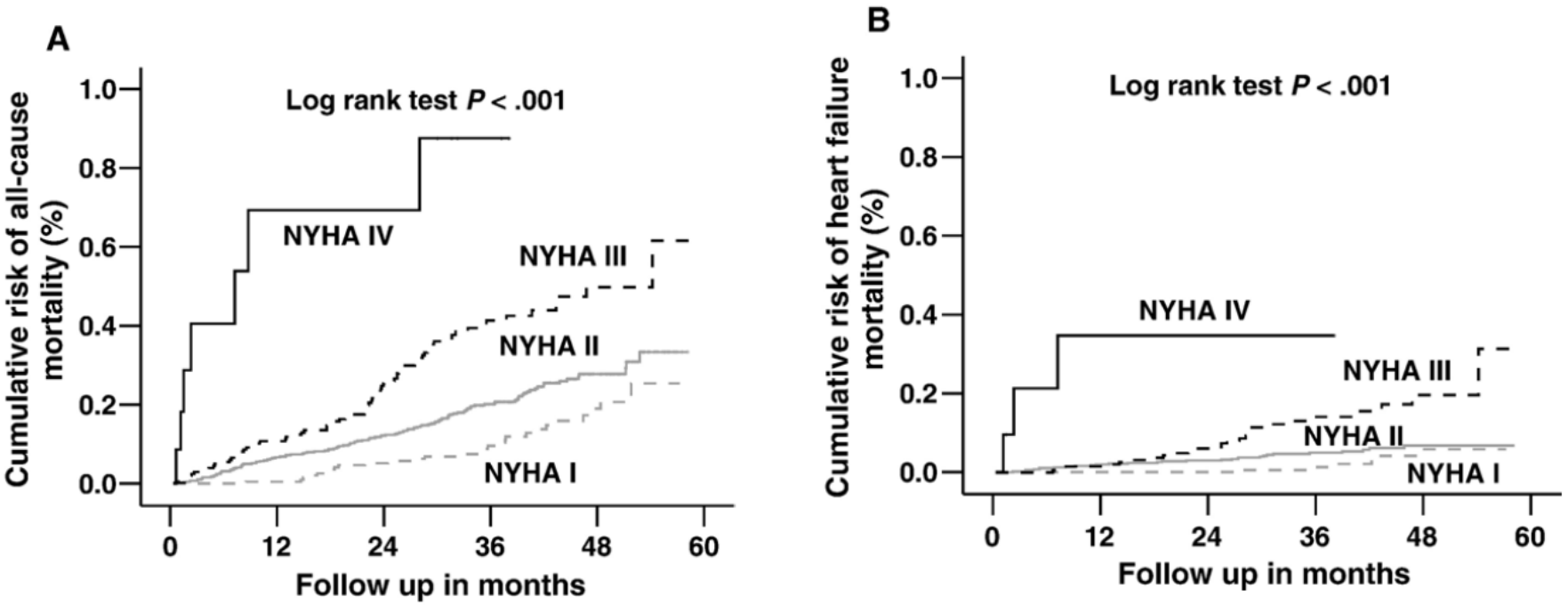
1. Roger et al. JAMA 2004;292:344–50; 2. Levy et al. N Engl J Med 2002;347:1397–402

HF progressive clinical course



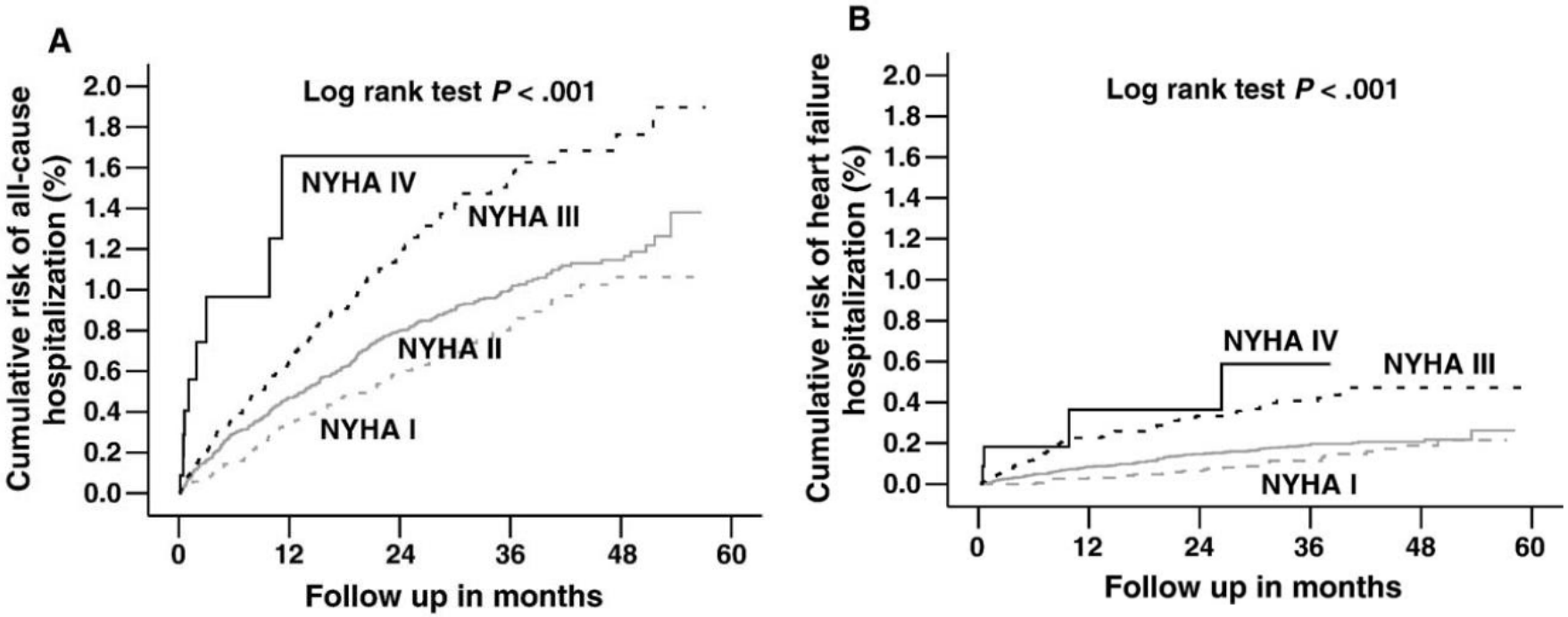
ADHF=acute decompensated heart failure; CPAP=continuous positive airway pressure; ICU=Intensive Care Unit
Modified from Gheorghiade et al. Am J Cardiol 2005;96:11G–17G

All cause mortality and HF mortality by NYHA functional class



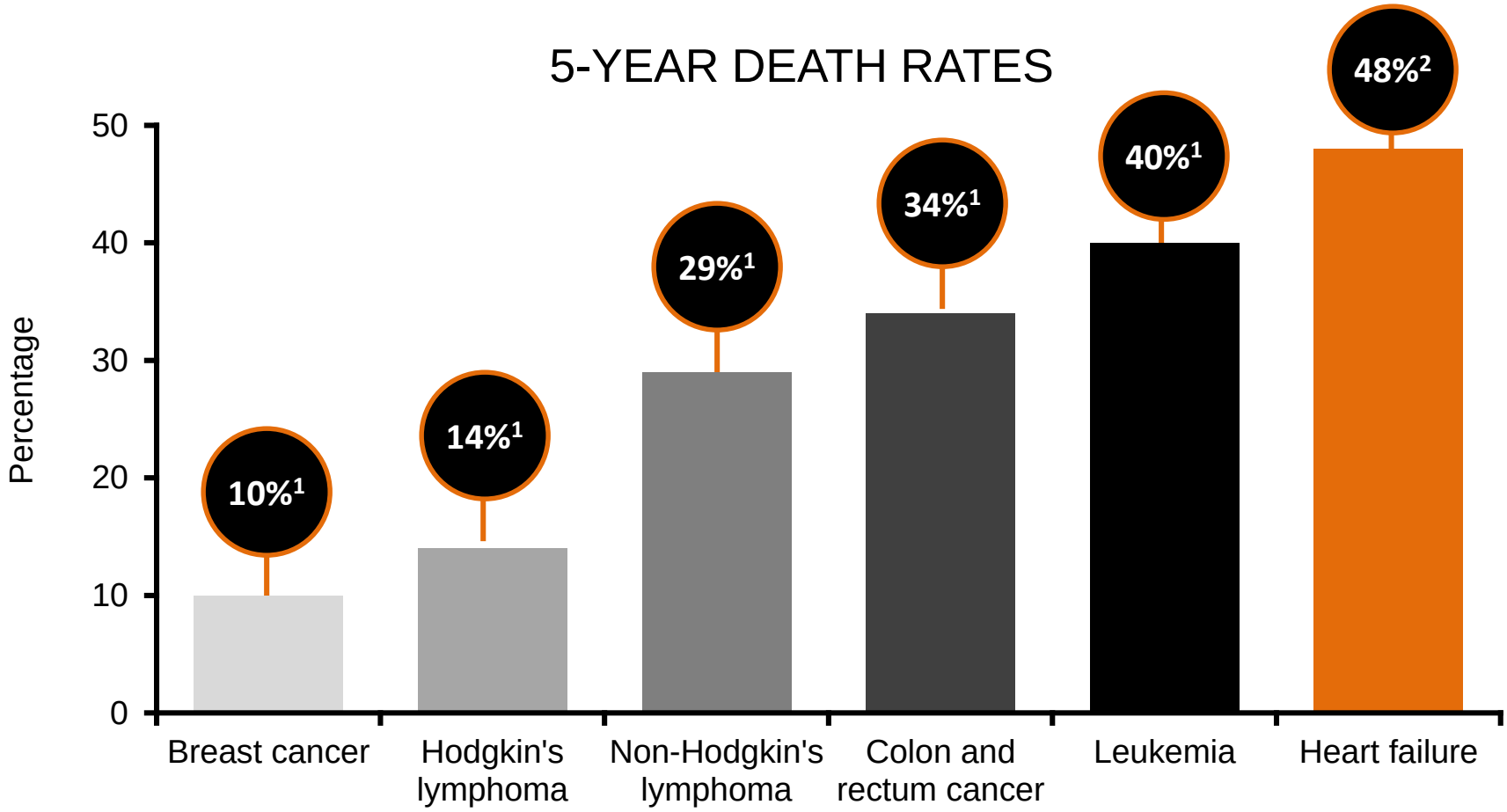
Ahmed et al. Am Heart J 2006;151:444–50

All cause hospitalization and hospitalization due to HF by NYHA functional class



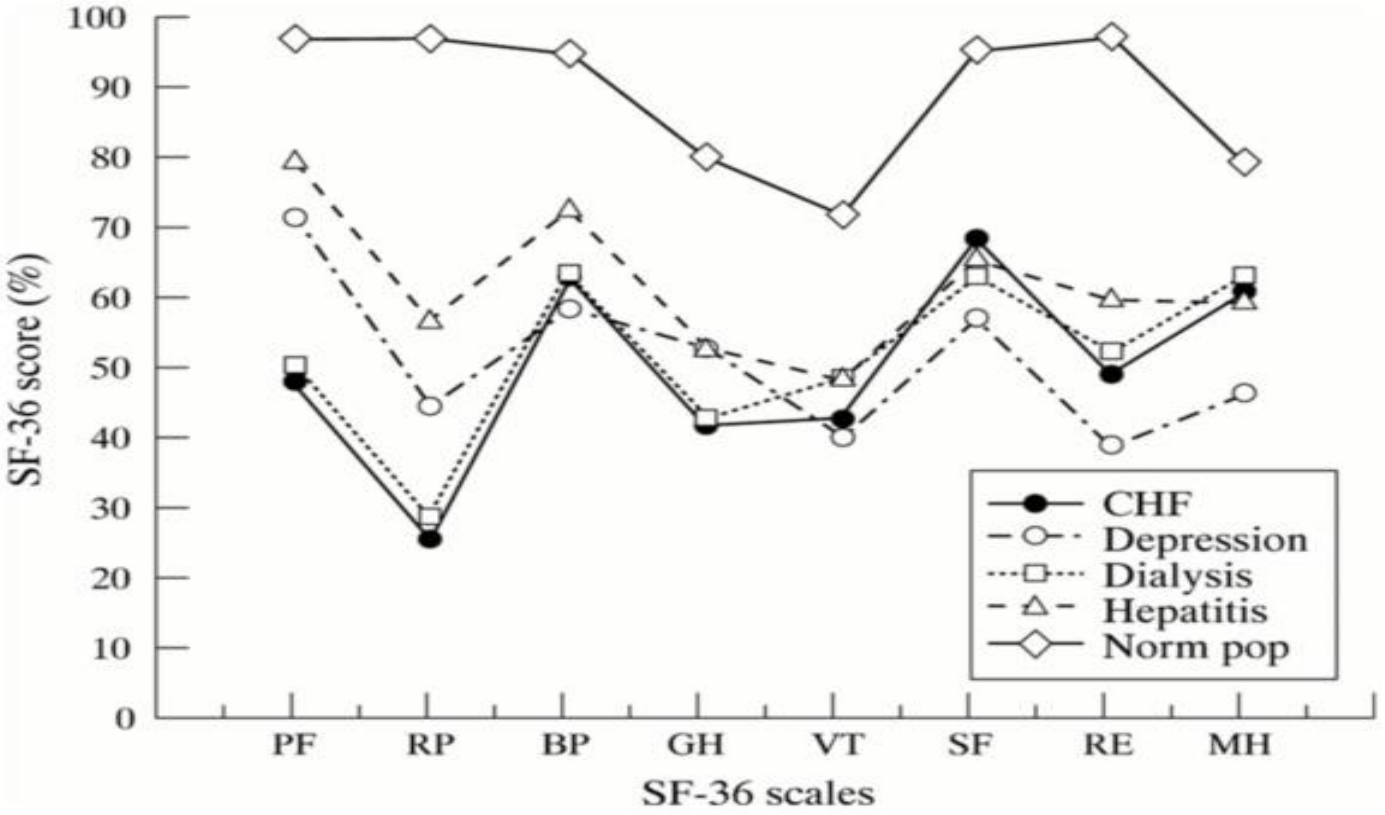
Ahmed et al. Am Heart J 2006;151:444–50

HFHF is deadlier than many cancers is deadlier than many cancers



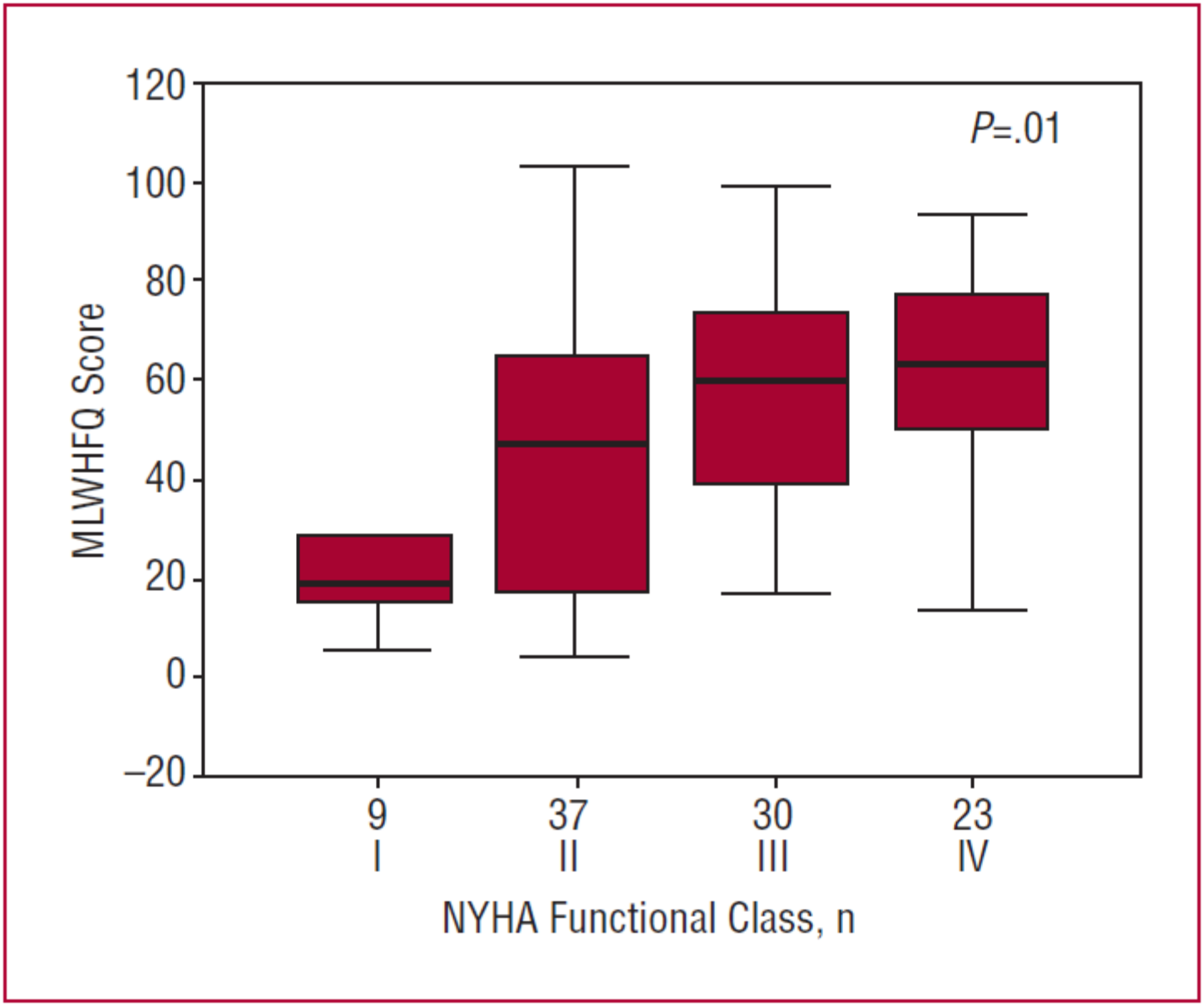
1. National Cancer Institute. Cancer stat fact sheets. Available at: http://seer.cancer.gov/statfacts. Accessed 31 May 2016; 2. Roger et al. JAMA 2004;292:344–50

Quality of life of patients with chronic HF is similar to other chronic diseases



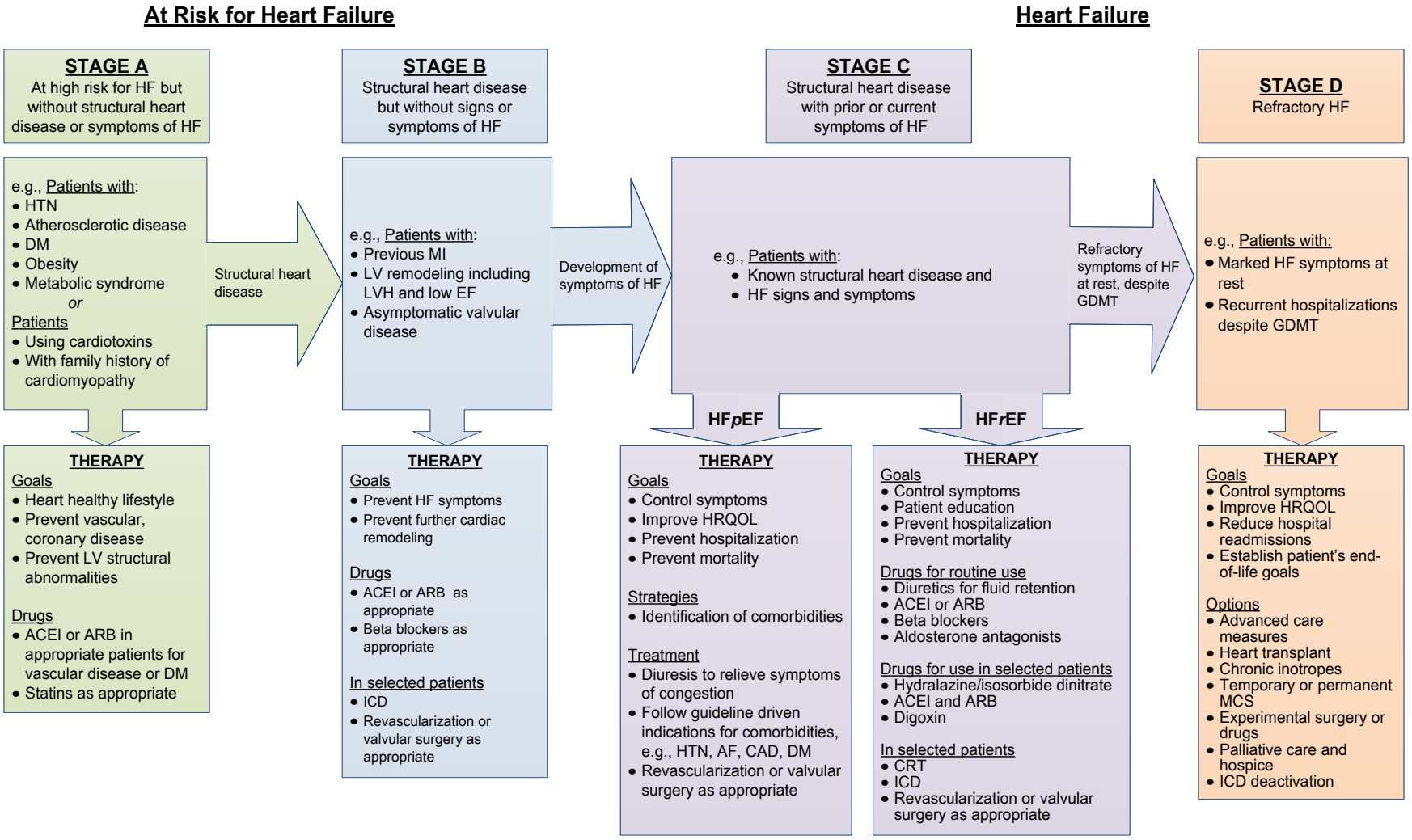
BP=bodily pain; CHF=chronic HF; GH=general health perceptions; MH=mental health; PF=physical functioning; RE=role limitations caused by emotional problems; RP=role limitations due to physical limitations; SF=social functioning; SF-36=short-form health survey; VT=vitality

Juenger et al. Heart 2002;87:235–41



Rev Esp Cardiol. 2007;60(10):1093-6

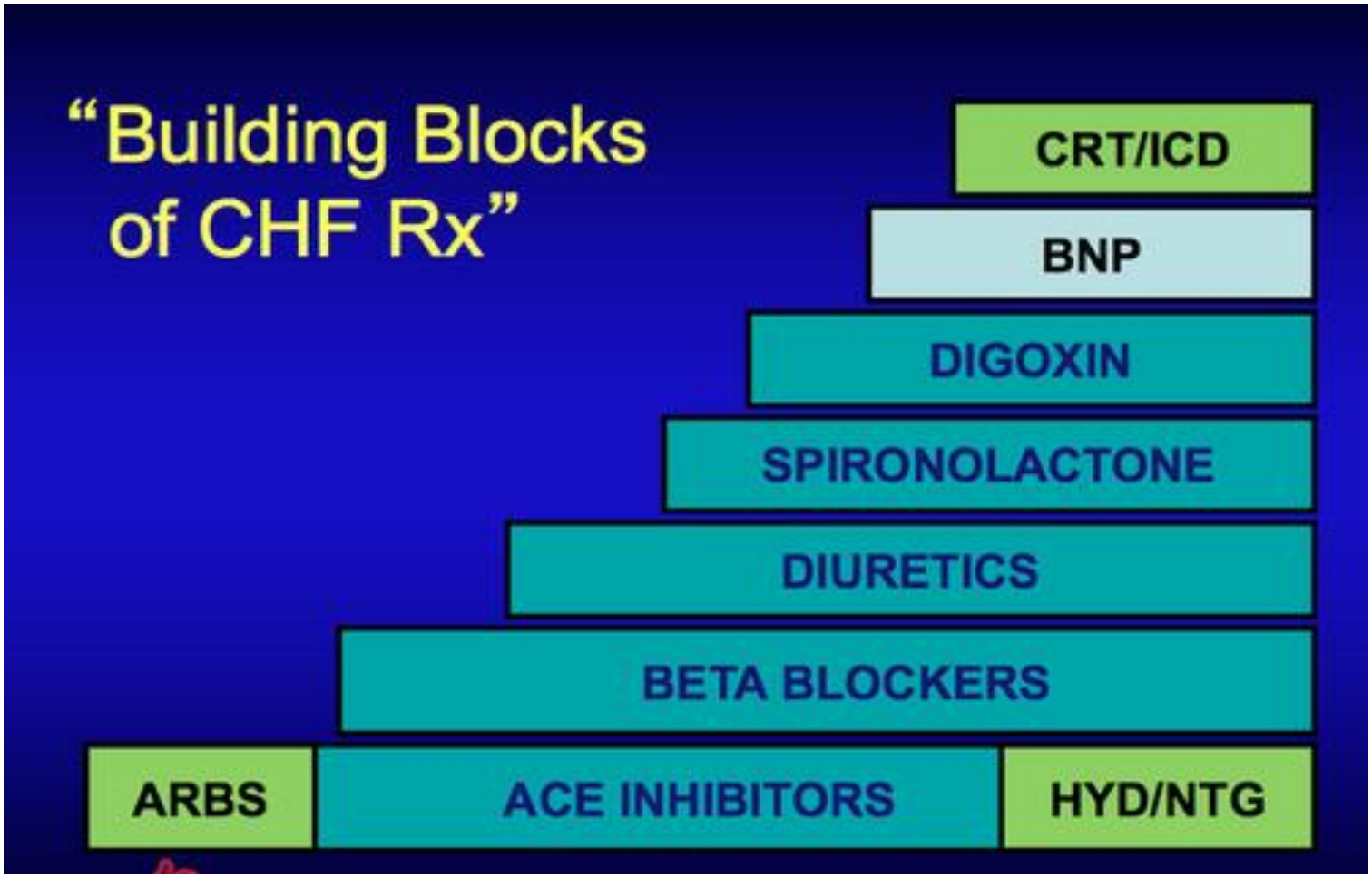
Stages, Phenotypes and Treatment of HF



LV function in Heart Failure

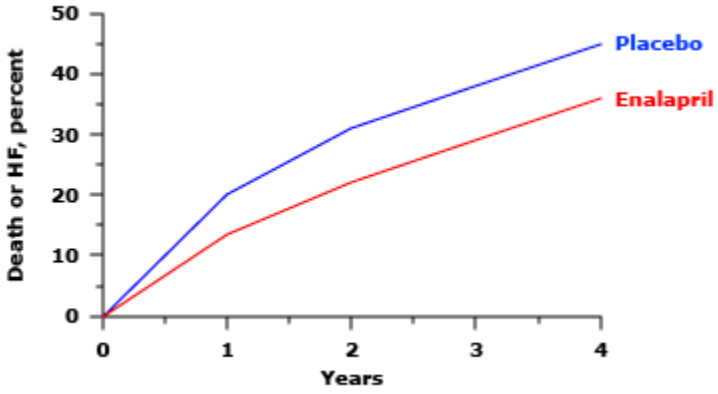
Classification	Ejection Fraction	Description
I. Heart Failure with Reduced Ejection Fraction (HF*r*EF)	≤40%	Also referred to as systolic HF. Randomized clinical trials have mainly enrolled patients with HF*r*EF and it is only in these patients that efficacious therapies have been demonstrated to date.
II. Heart Failure with Preserved Ejection Fraction (HF*p*EF)	≥50%	Also referred to as diastolic HF. Several different criteria have been used to further define HF*p*EF. The diagnosis of HF*p*EF is challenging because it is largely one of excluding other potential noncardiac causes of symptoms suggestive of HF. To date, efficacious therapies have not been identified.
a. HF*p*EF, Borderline	41% to 49%	These patients fall into a borderline or intermediate group. Their characteristics, treatment patterns, and outcomes appear similar to those of patient with HF*p*EF.
b. HF*p*EF, Improved	>40%	It has been recognized that a subset of patients with HF*p*EF previously had HF*r*EF. These patients with improvement or recovery in EF may be clinically distinct from those with persistently preserved or reduced EF. Further research is needed to better characterize these patients.

Medications

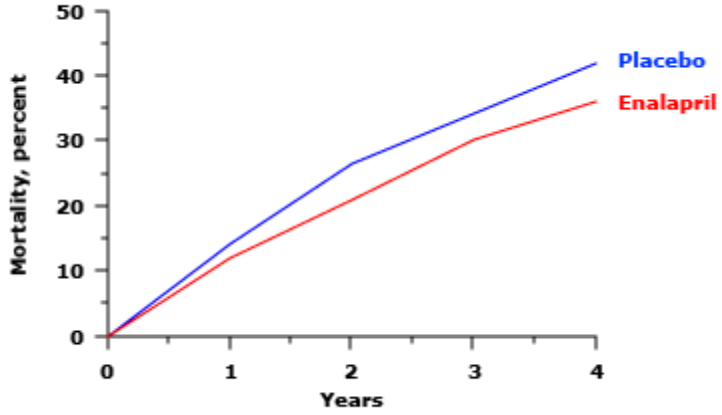


Angiotensin Converting Enzyme Inhibitors

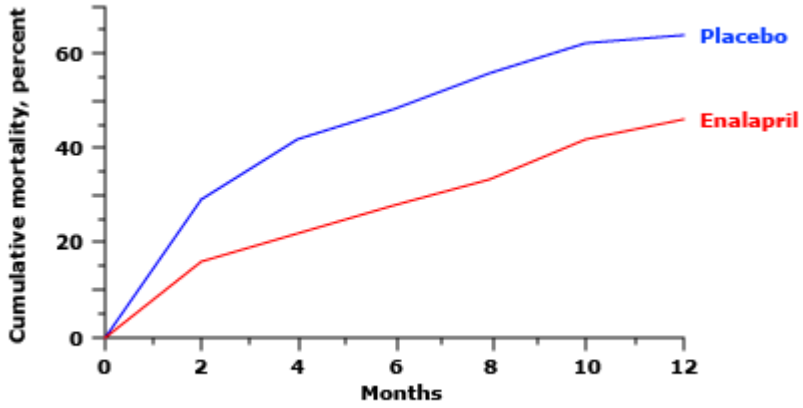
asymptomatic LV dysfunction



in moderate HF



in advanced HF



CONSENSUS, N Engl J Med 1987; 316:1429.

- ACE inhibitors are recommended for routine administration to symptomatic and asymptomatic patients with LVEF ≤ 40%. (Strength of Evidence A)

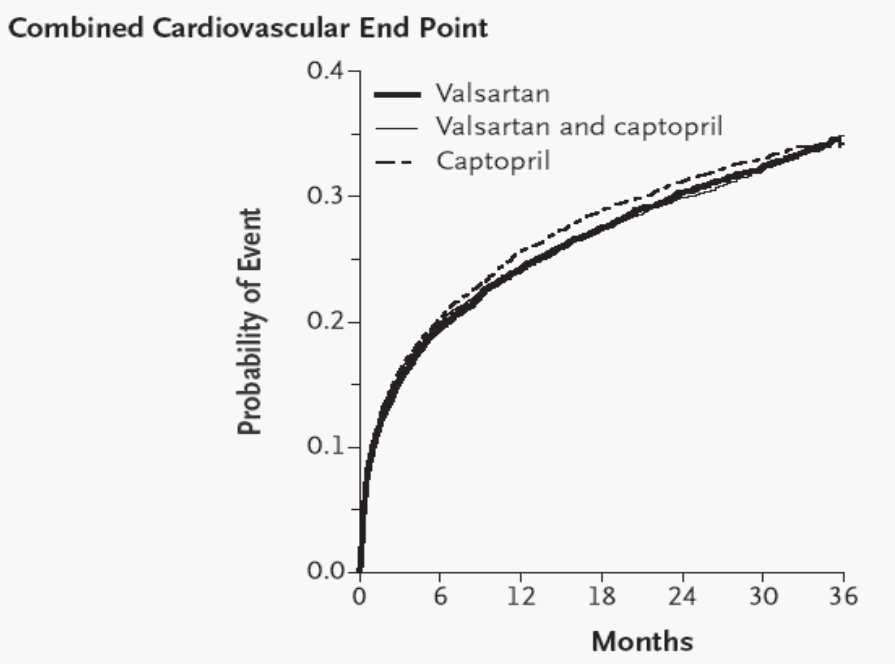
- ACE inhibitors should be titrated to doses used in clinical trials, as tolerated

HFSA Guidelines 2010

Angiotensin Receptor Blockers

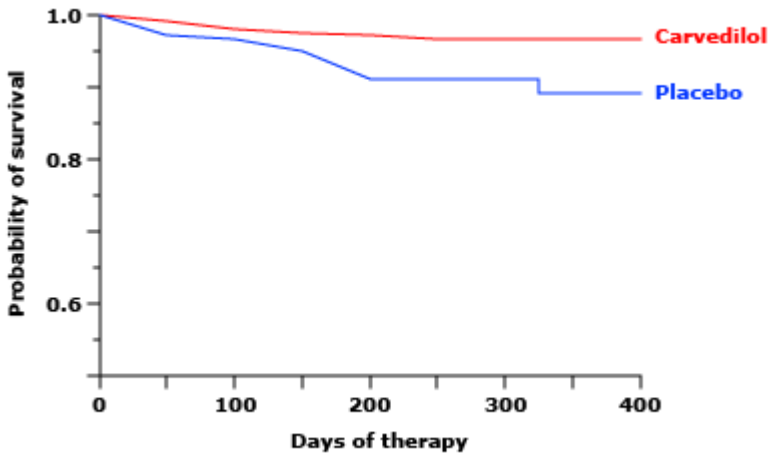
- ACEI remain the first choice for inhibition of the renin-angiotensin system in chronic HF,
- ARBs can be considered

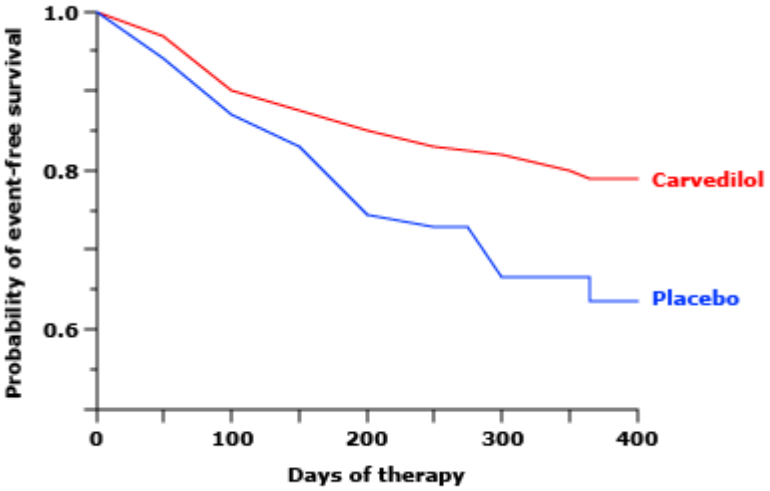
a reasonable alternative



VALIANT N Engl J Med 2003;349:1893-906

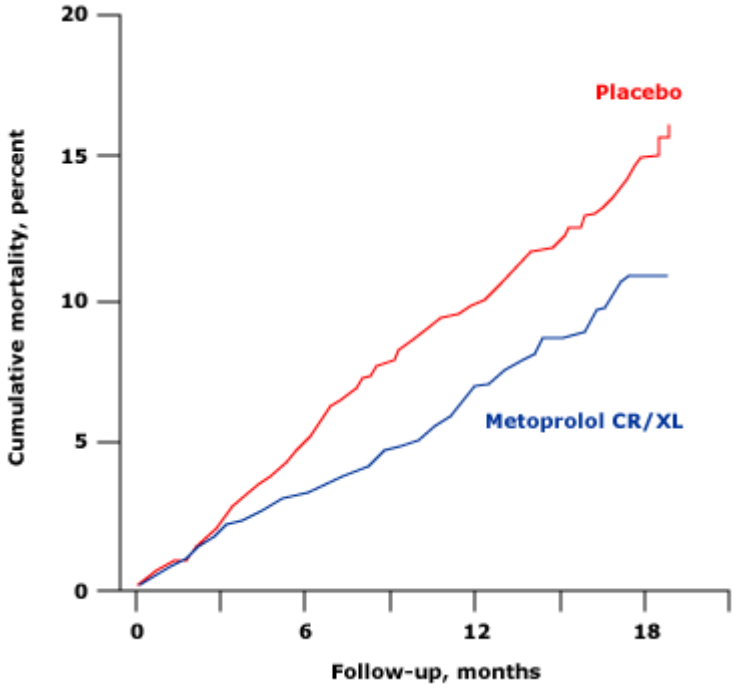
Beta Blockers

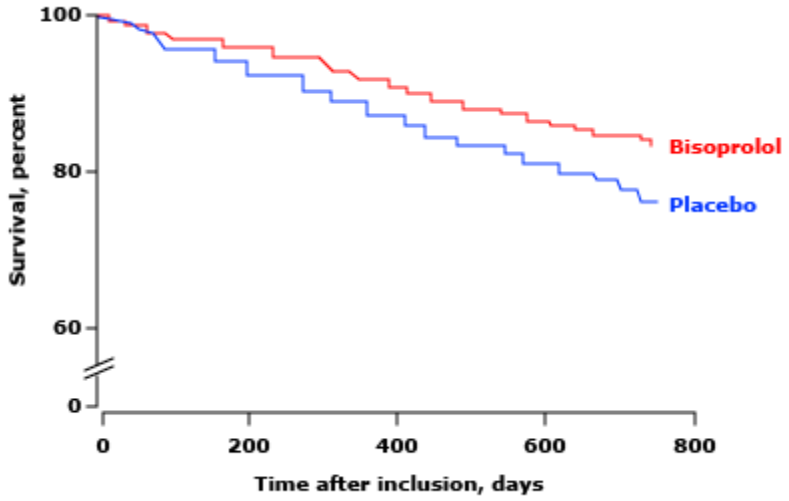




N Engl J Med 1996; 334:1349.

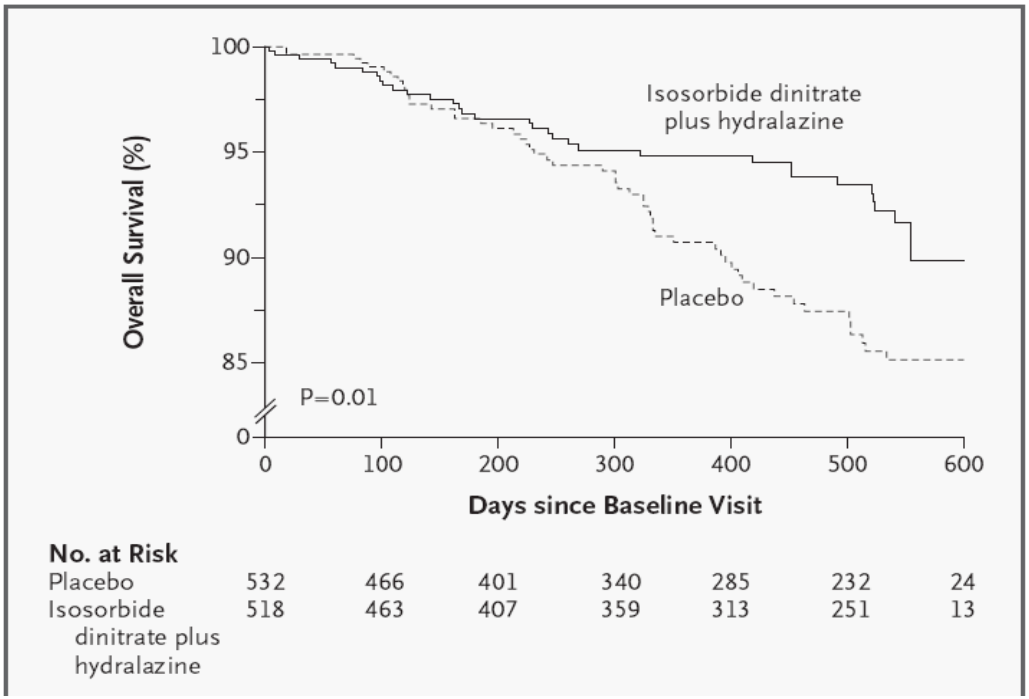
The MERIT-HF Study Group, Lancet 1999; 353:2001



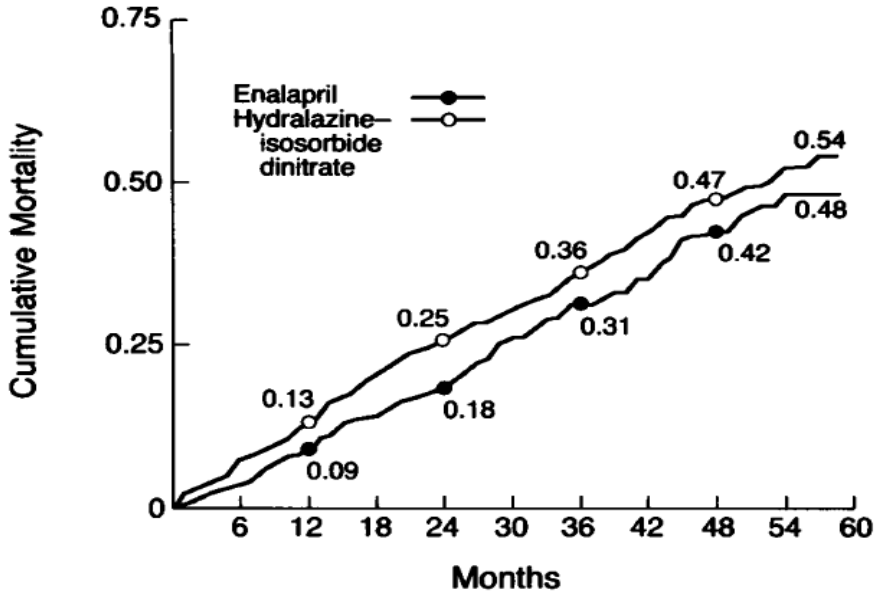


CIBIS-II Investigators and Committees. Lancet 1999; 353:9

Hydralazine / Nitrates



A-HeFT N Engl J Med 2004;351:2049-57



V-HeFT II N Engl J Med 1991; 325:303-10

- Treatment with a combination of hydralazine plus nitrate in patients with HF and reduced LVEF who are unable to take ACE inhibitor or ARB

- Patients with persistent NYHA class III to IV HF and LVEF <40 percent despite optimal therapy the addition of the combination of hydralazine and an oral nitrate is recommended

MRA

- NYHA class II-IV

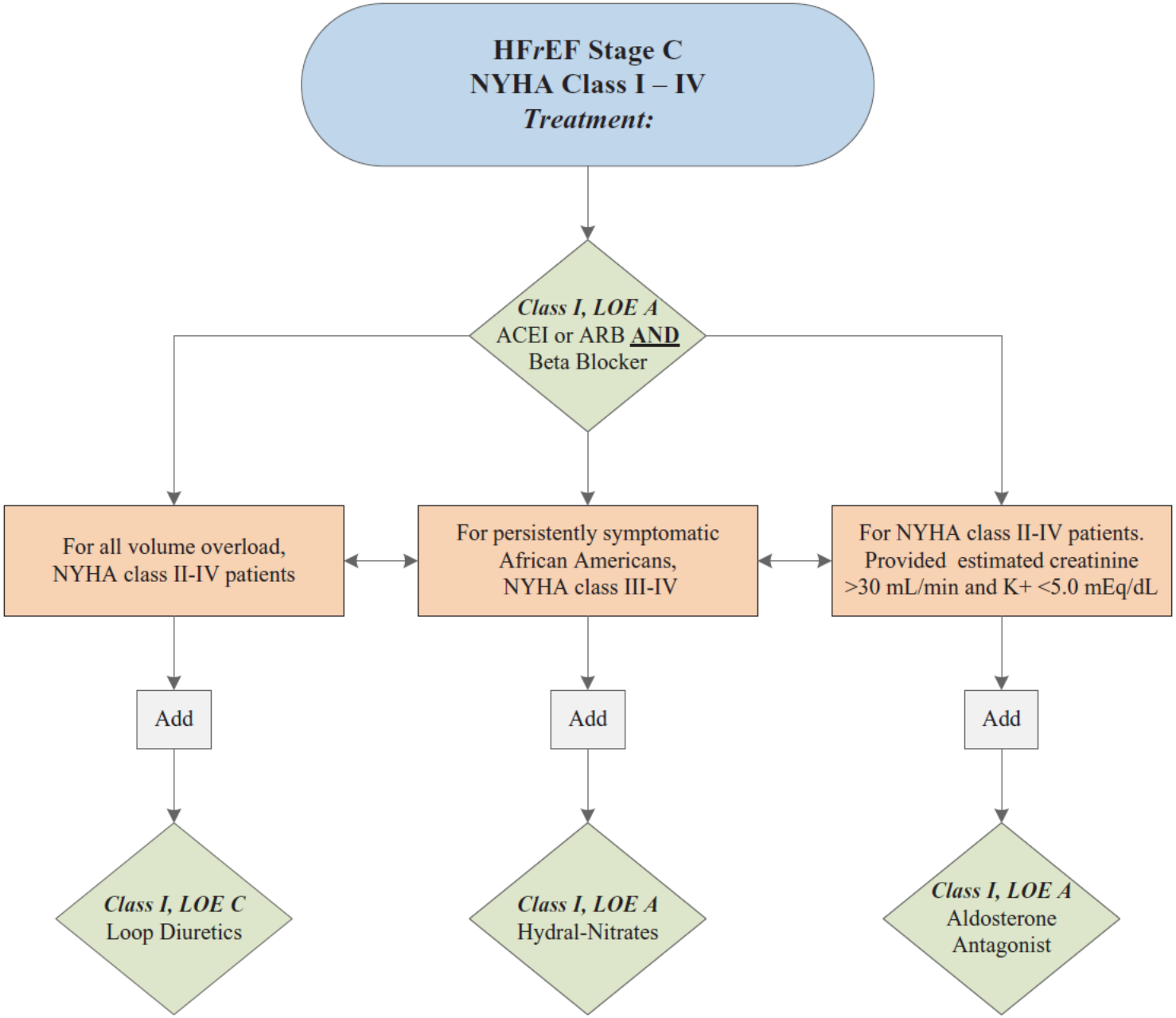
- Post MI, LVEF <40%
- HF symptoms or DM

- Spironolactone vs. Eplerenone

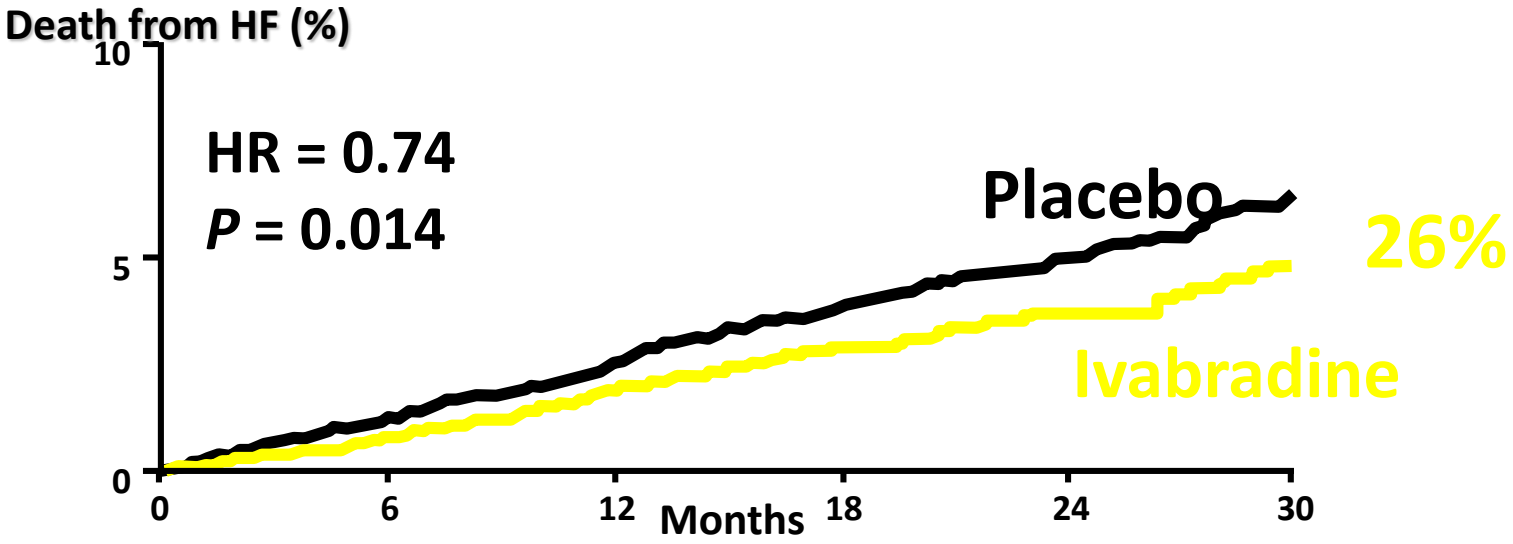
N Engl J Med 2003;348:1309-21

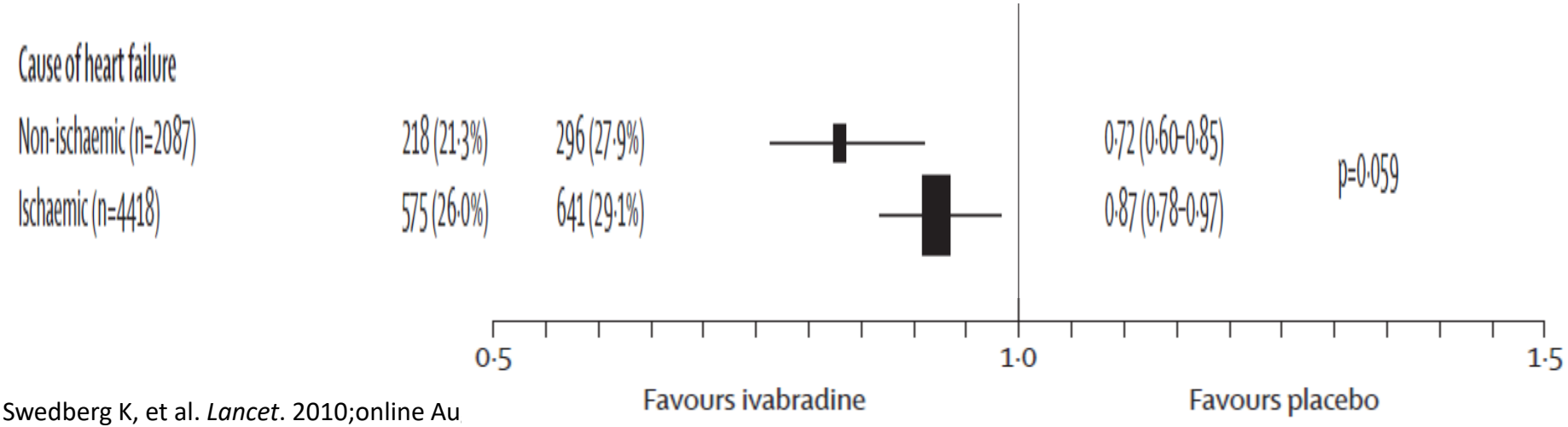
- Aldosterone receptor antagonists (or mineralocorticoid receptor antagonists) are recommended in patients with NYHA class II–IV HF and who have LVEF of 35% or less, to reduce morbidity and mortality.

- Aldosterone receptor antagonists are recommended to reduce morbidity and mortality following an acute MI in patients who have LVEF of 40% or less who develop symptoms of HF or who have a history of diabetes mellitus


HFrEF Stage C
NYHA Class I – IV
Treatment:
Class I, LOE A
ACEI or ARB AND
Beta Blocker
For all volume overload,
NYHA class II-IV patients
For persistently symptomatic
African Americans,
NYHA class III-IV
For NYHA class II-IV patients.
Provided estimated creatinine
>30 mL/min and K+ <5.0 mEq/dL
Add
Add
Add
Class I, LOE C
Loop Diuretics
Class I, LOE A
Hydral-Nitrates
Class I, LOE A
Aldosterone
Antagonist

Ivabradine reduced death from heart failure



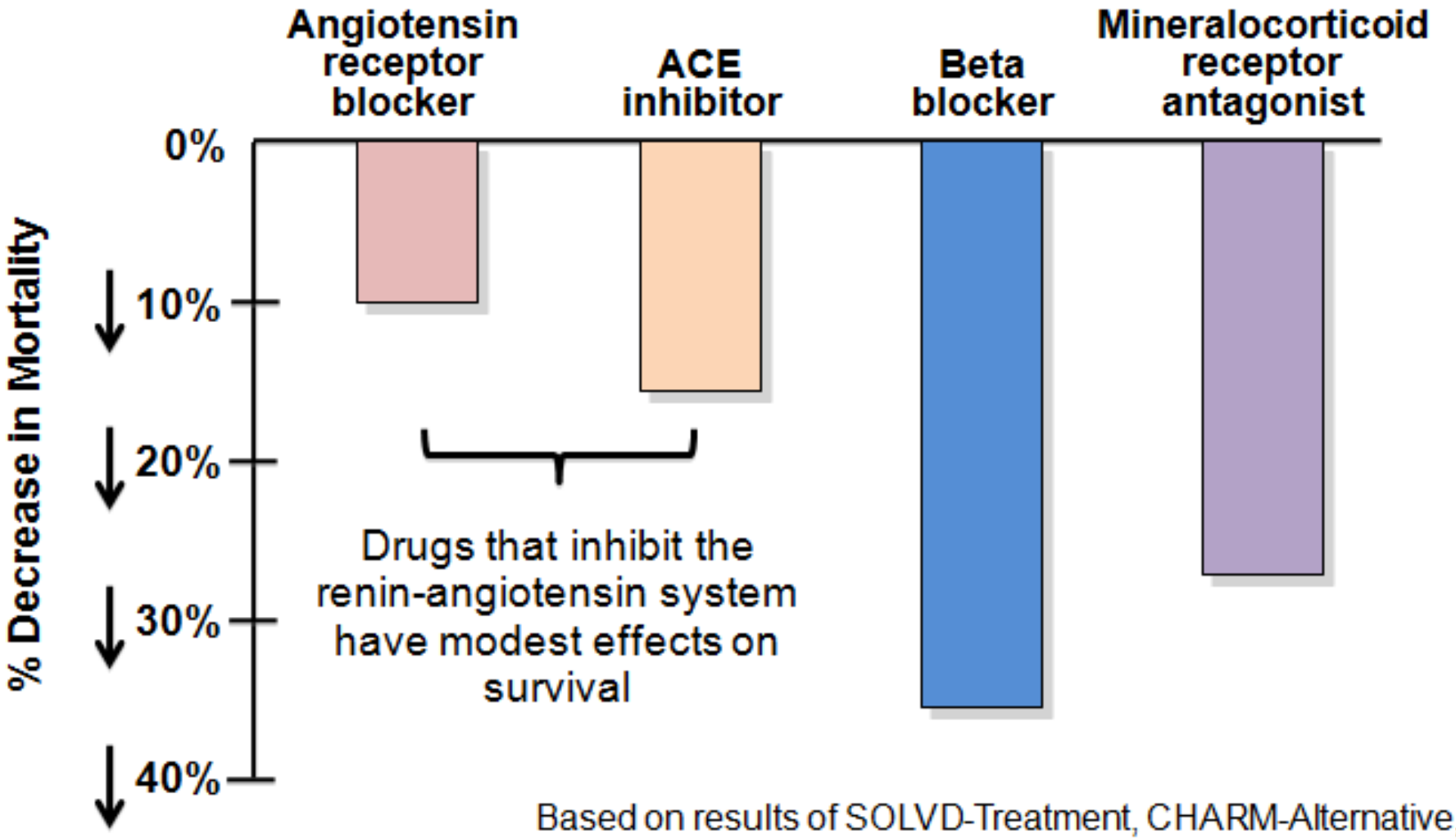


Swedberg K, et al. *Lancet*. 2010;online Au

ESC Guidelines

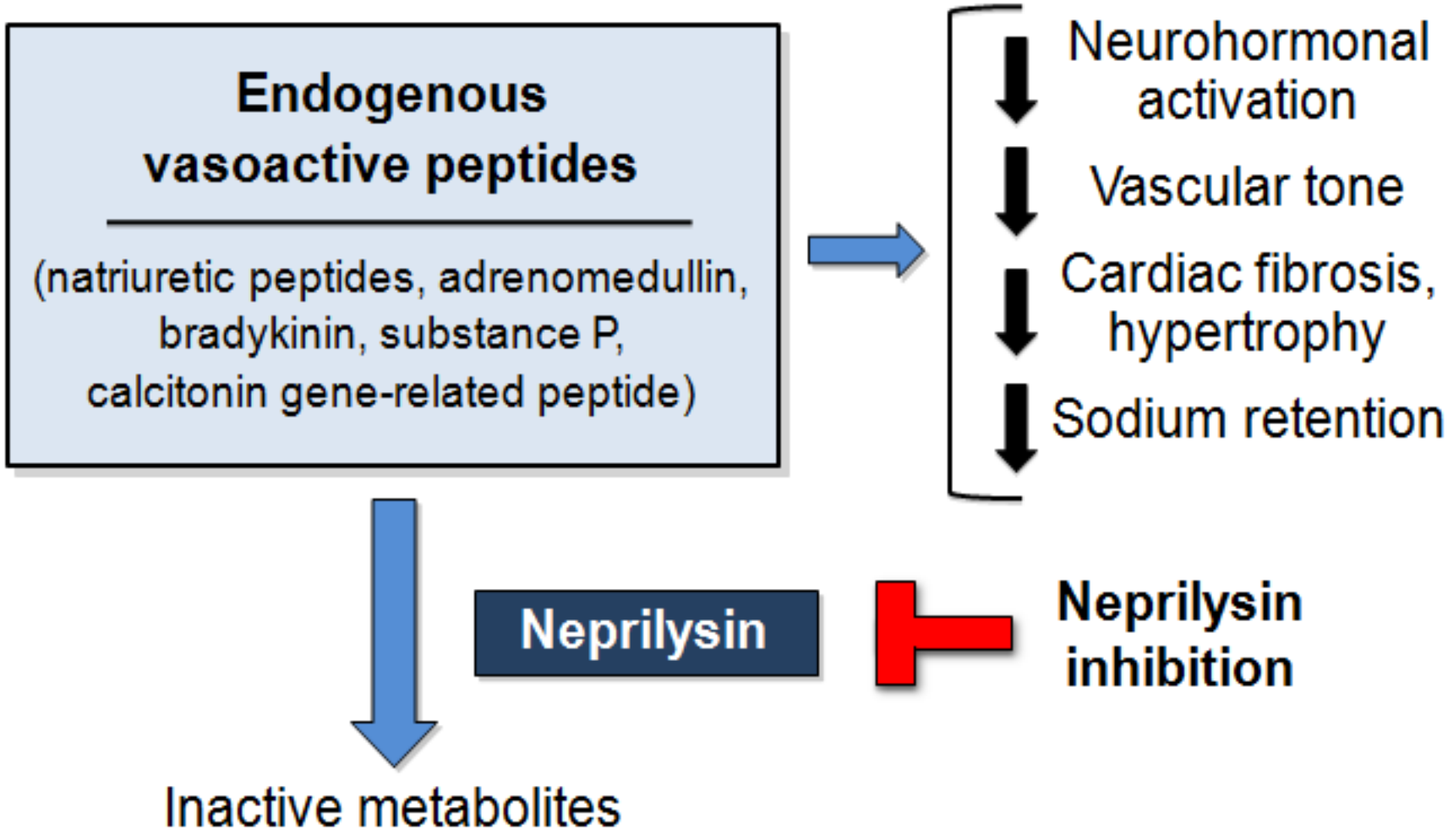
Ivabradine		
Should be considered to reduce the risk of HF hospitalization in patients in sinus rhythm with an EF ≤35%, a heart rate remaining ≥70 b.p.m., and persisting symptoms (NYHA class II–IV) despite treatment with an evidence-based dose of beta-blocker (or maximum tolerated dose below that), ACE inhibitor (or ARB), and an MRA (or ARB).[a]	IIa	B
May be considered to reduce the risk of HF hospitalization in patients in sinus rhythm with an EF ≤35% and a heart rate ≥70 b.p.m. who are unable to tolerate a beta-blocker. Patients should also receive an ACE inhibitor (or ARB) and an MRA (or ARB).[a]	IIb	C
Digoxin		

Drugs That reduce Mortality in Heart Failure With Reduced EF

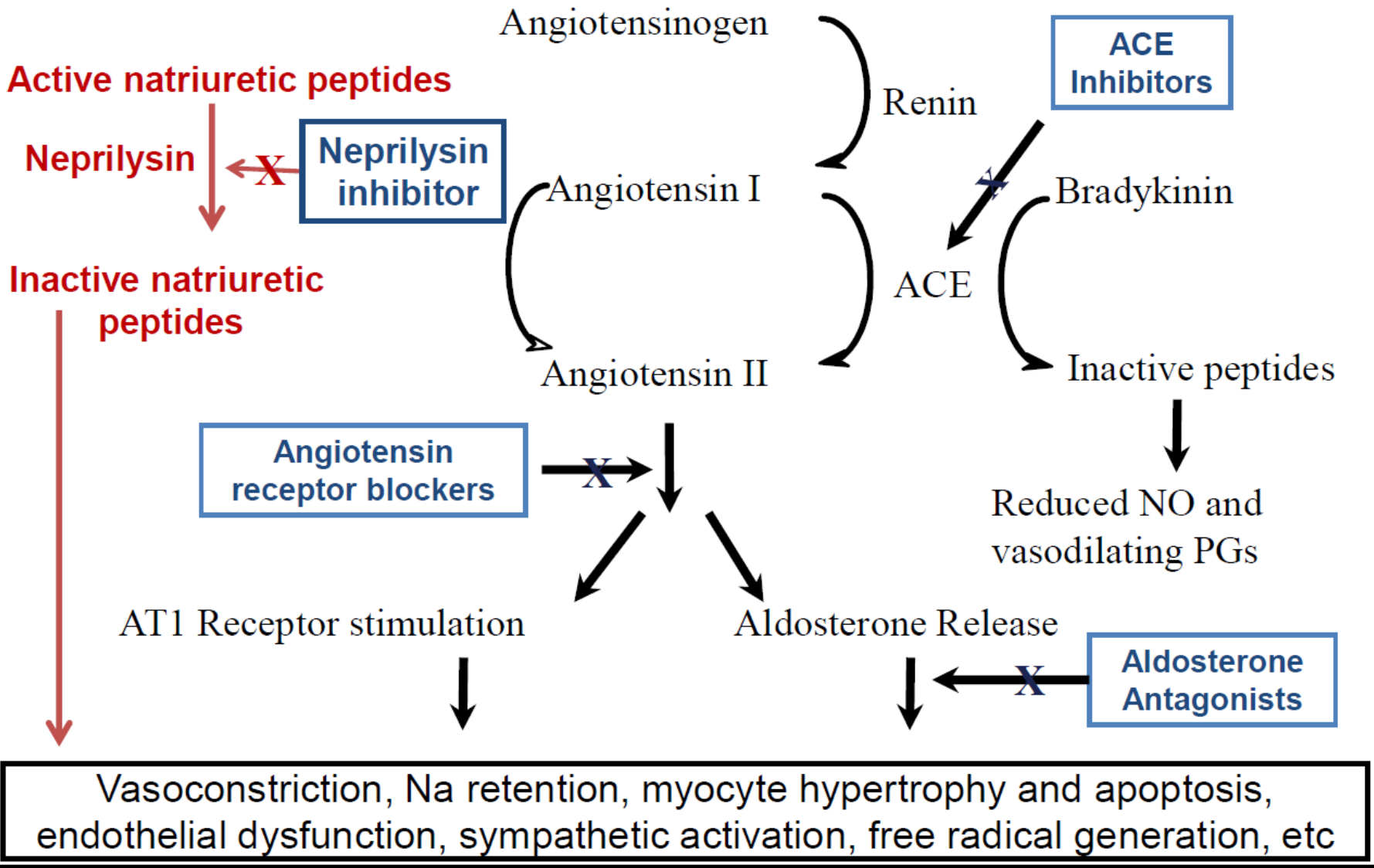


Based on results of SOLVD-Treatment, CHARM-Alternative, COPERNICUS, MERIT-HF, CIBIS II, RALES and EMPHASIS-HF

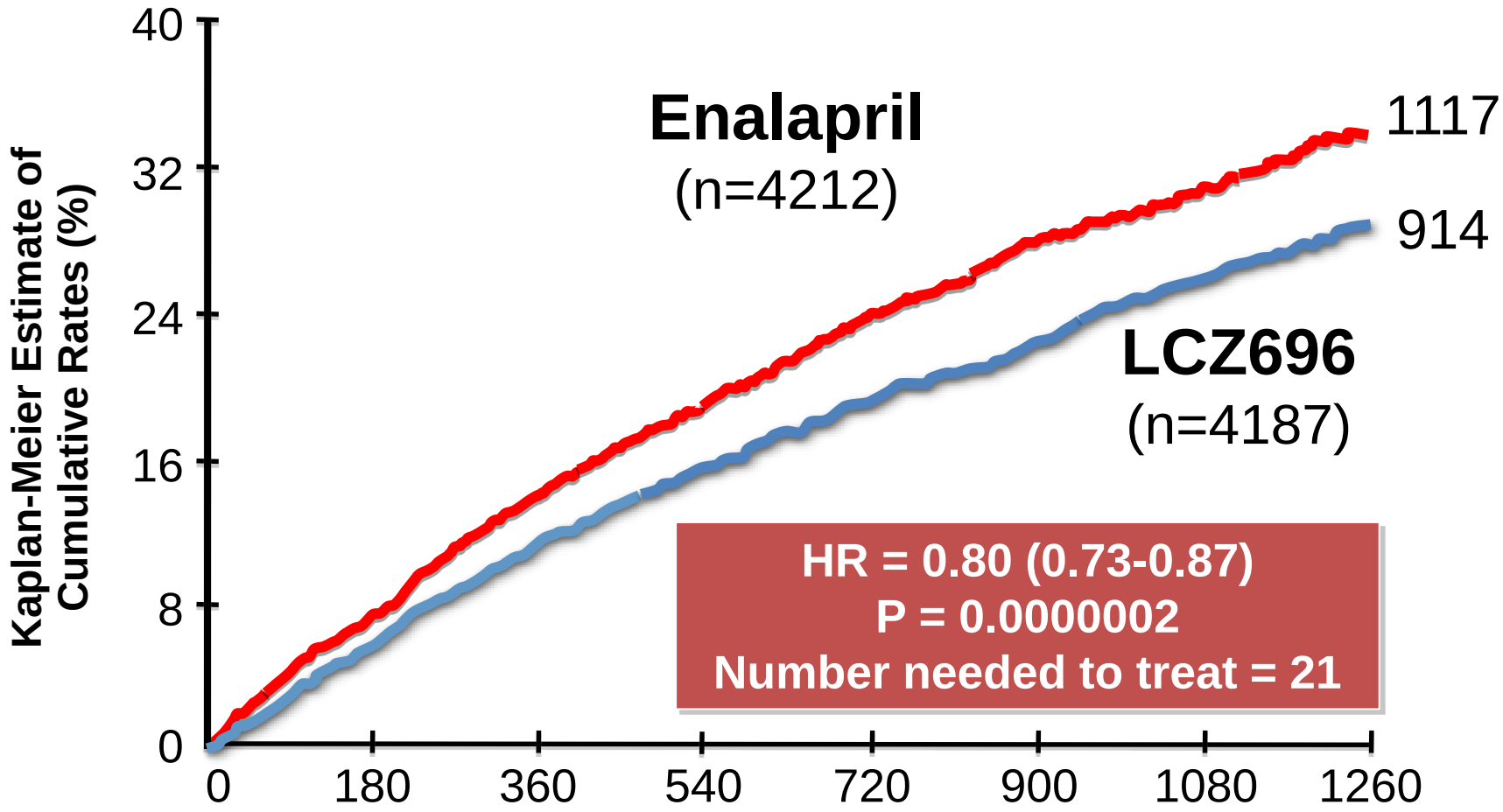
Neprilysin Inhibition Potentiate Actions of Vasoactive Peptides That counter Maladaptive Mechanisms in Heart Failure



Neurohormonal blockade in HF – revisited

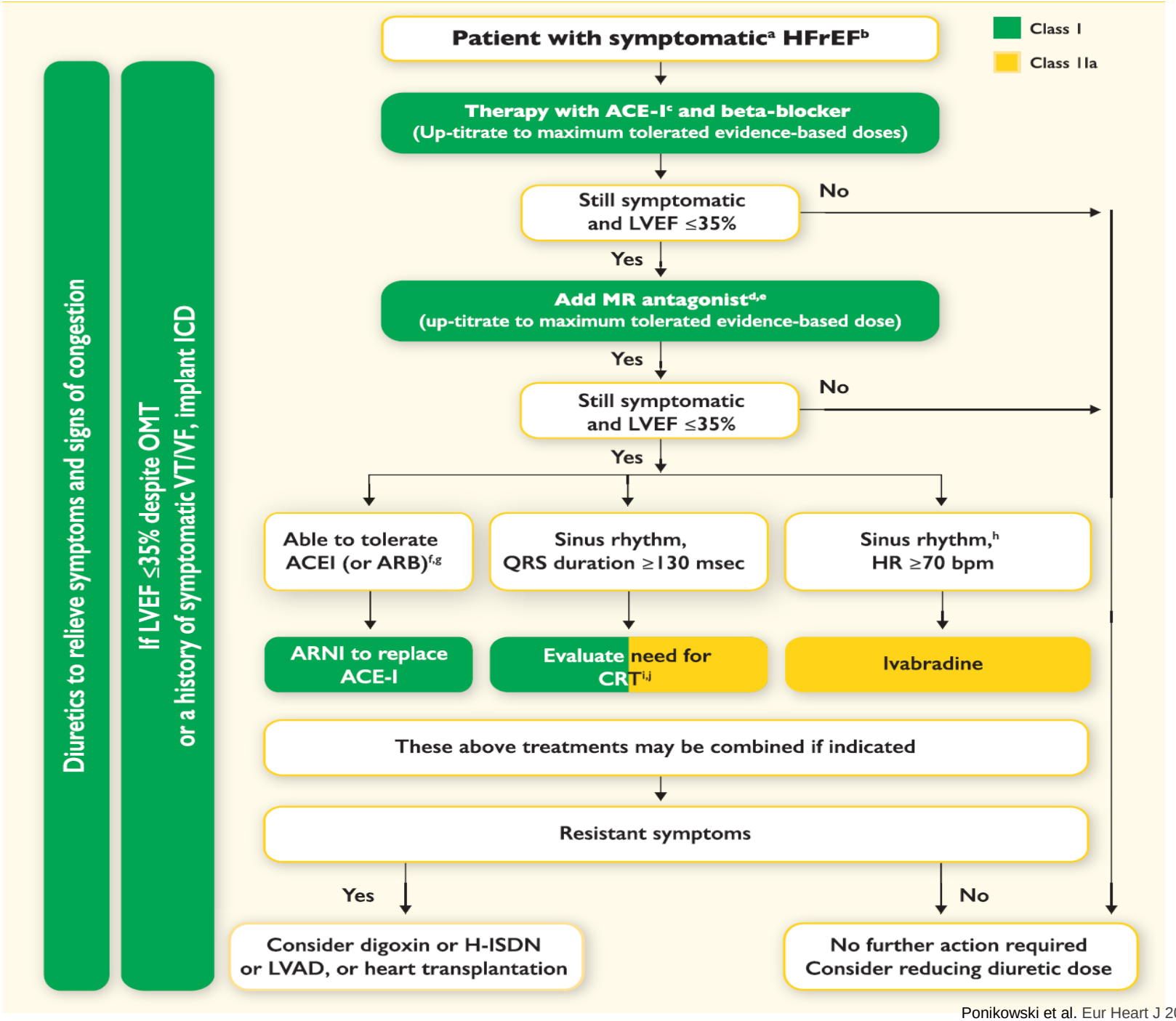


PARADIGM-HF: Cardiovascular Death or Heart Failure Hospitalization (Primary Endpoint)



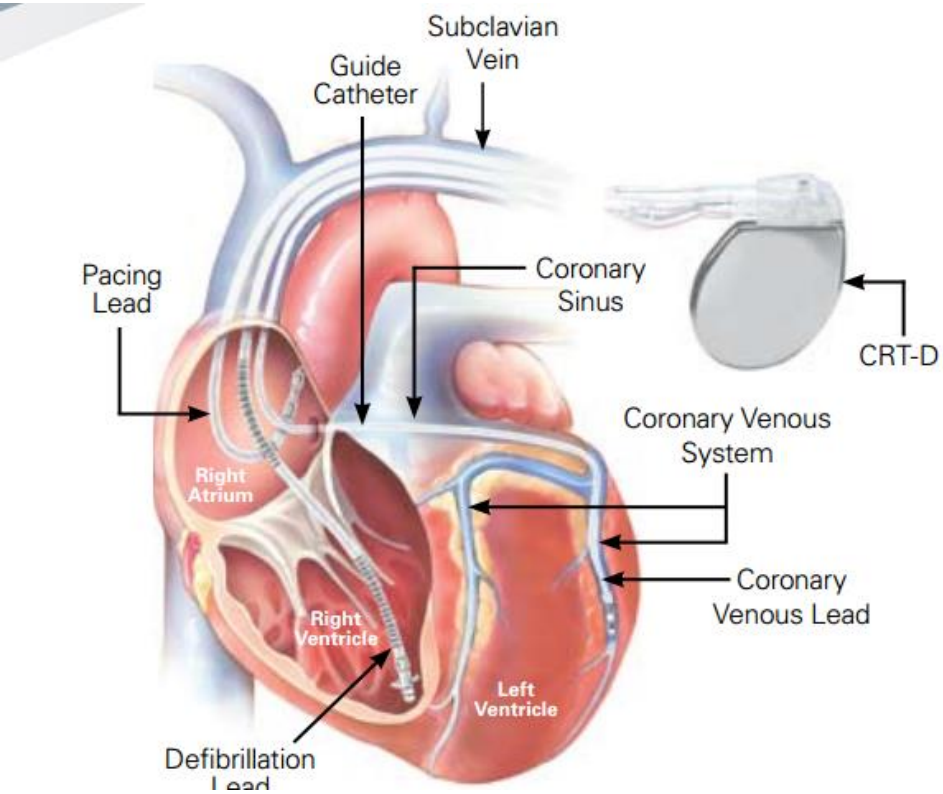
Patients at Risk

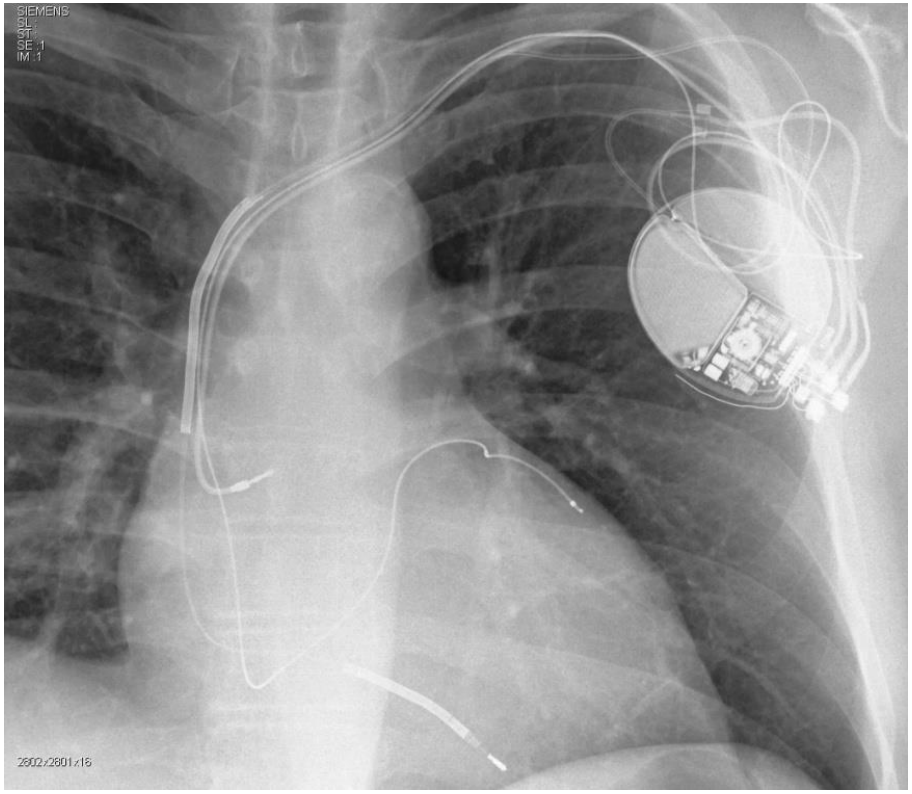
LCZ696	4187	3922	3663	3018	2257	1544	896	249
Enalapril	4212	3883	3579	2922	2123	1488	853	236



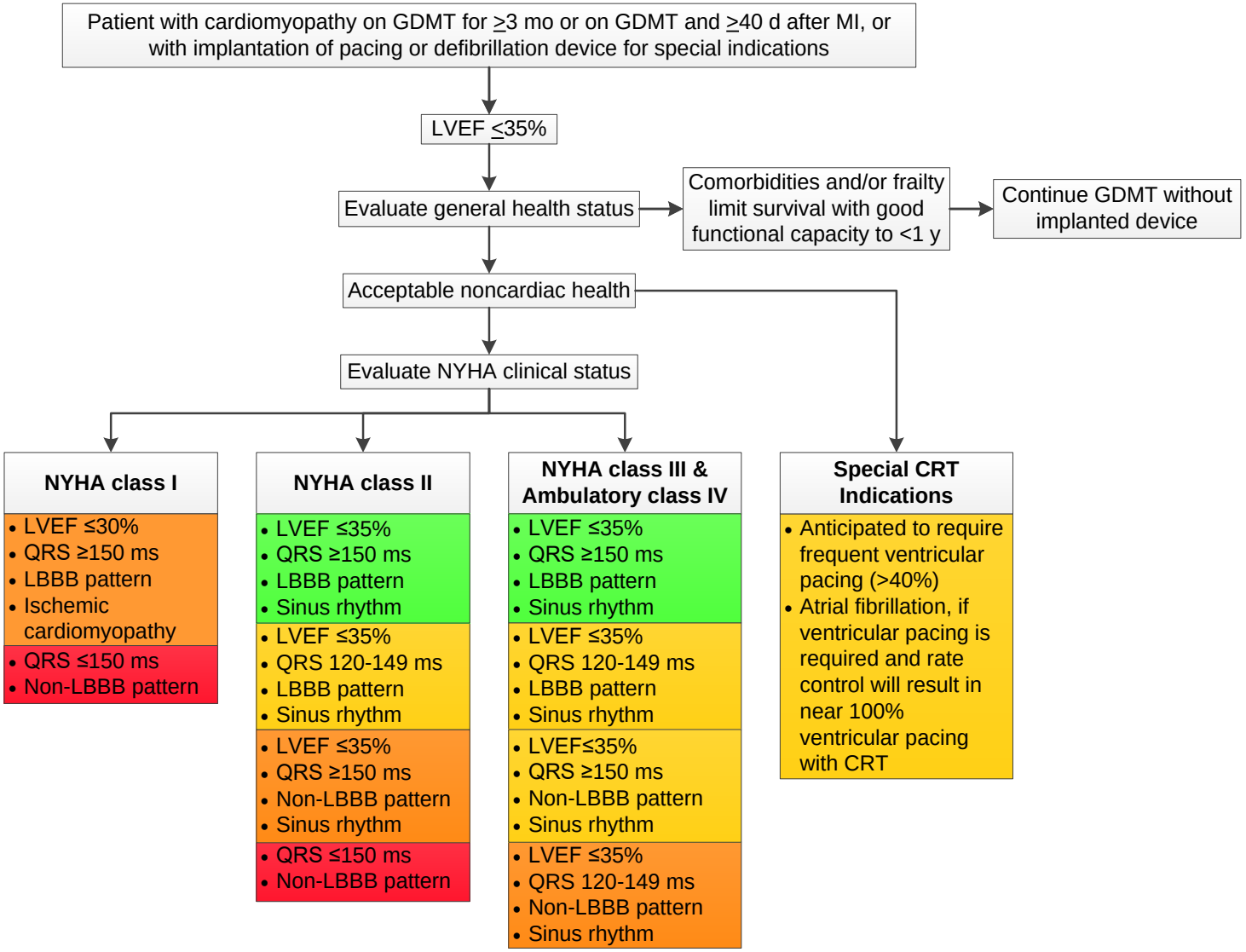
Ponikowski et al. Eur Heart J 2016;37:2129–2200

Devices


Subclavian Vein
Guide Catheter
Pacing Lead
Coronary Sinus
CRT-D
Coronary Venous System
Right Atrium
Coronary Venous Lead
Right Ventricle
Left Ventricle
Defibrillation Lead



Indications for CRT Therapy



Colors correspond to the class of recommendations in the ACCF/AHA Table 1.

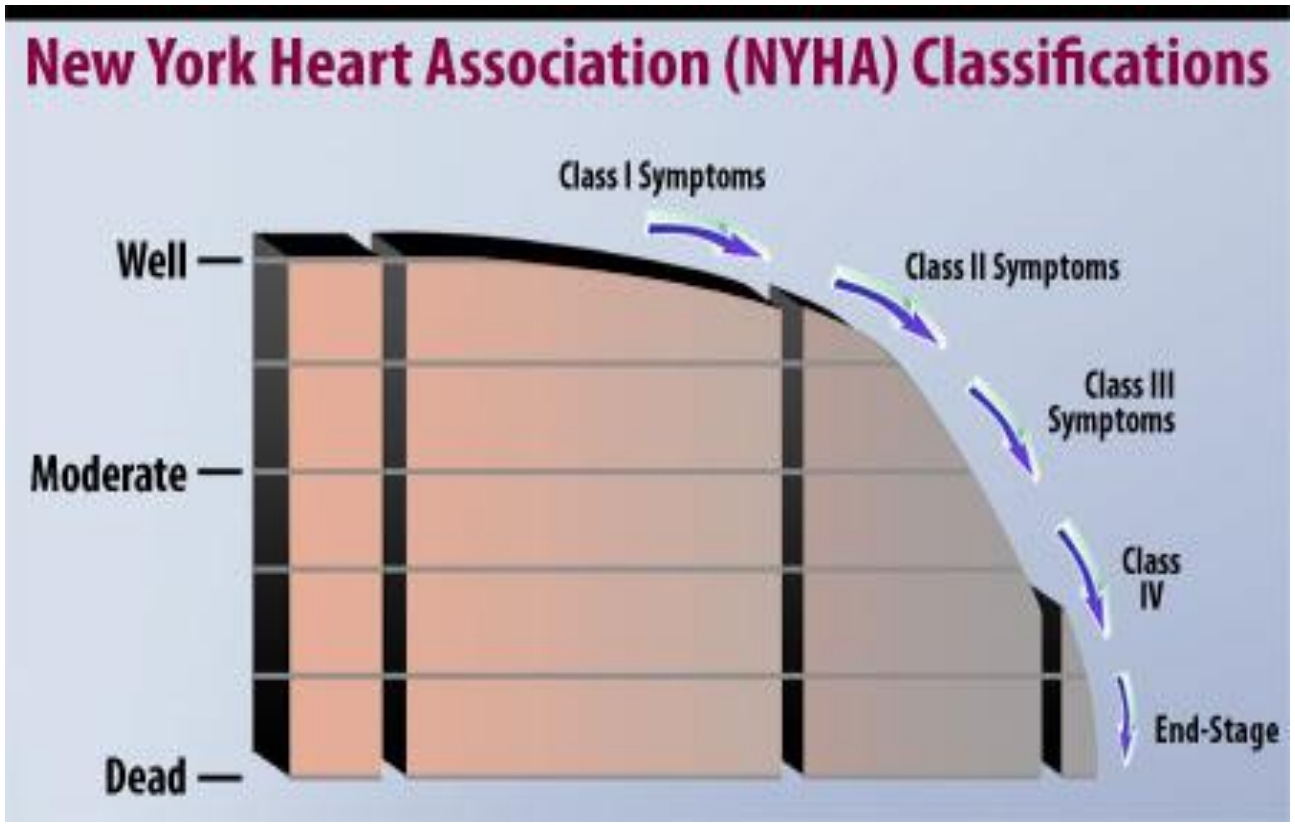
Benefit for NYHA class I and II patients has only been shown in CRT-D trials, and while patients may not experience immediate symptomatic benefit, late remodeling may be avoided along with long-term HF consequences. There are no trials that support CRT-pacing (without ICD) in NYHA class I and II patients. Thus, it is anticipated these patients would receive CRT-D unless clinical reasons or personal wishes make CRT-pacing more appropriate. In patients who are NYHA class III and ambulatory class IV, CRT-D may be chosen but clinical reasons and personal wishes may make CRT-pacing appropriate to improve symptoms and quality of life when an ICD is not expected to produce meaningful benefit in survival.

Advanced heart failure

- *Defined* as persistent symptoms (NYHA class III–IV) that limit daily life despite routine therapy with agents of known benefit

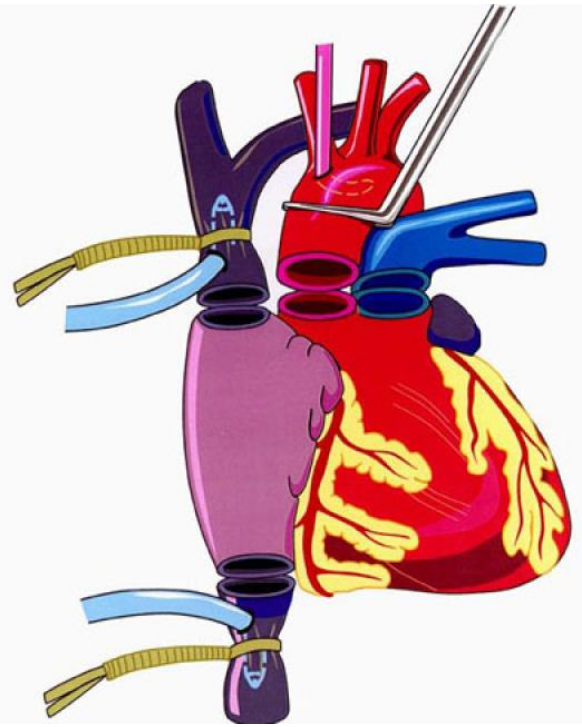
- End-stage, refractory heart failure, probably accounts for 5% to 10% of the total population

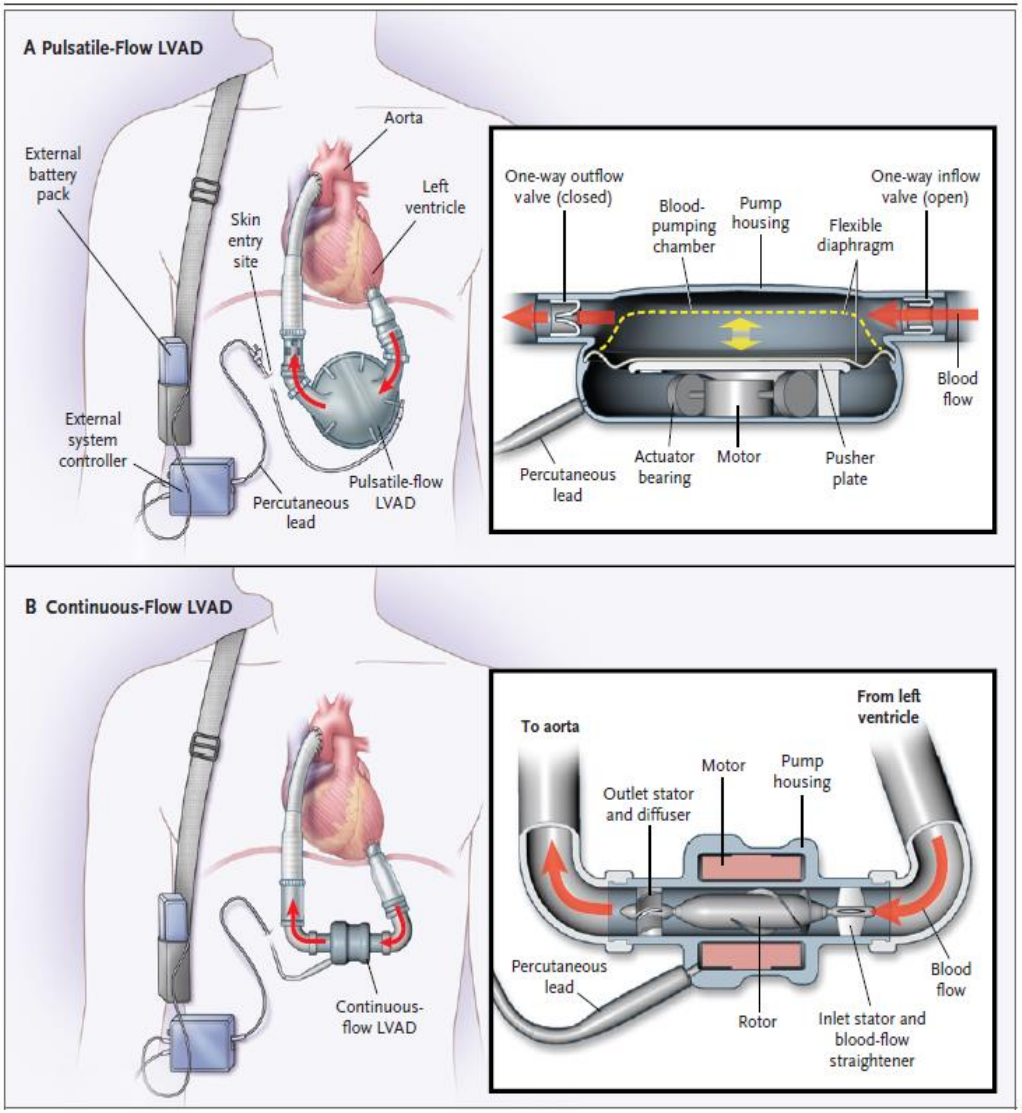
- This group, consumes >60% of health-care expenditures for all patients with heart failure

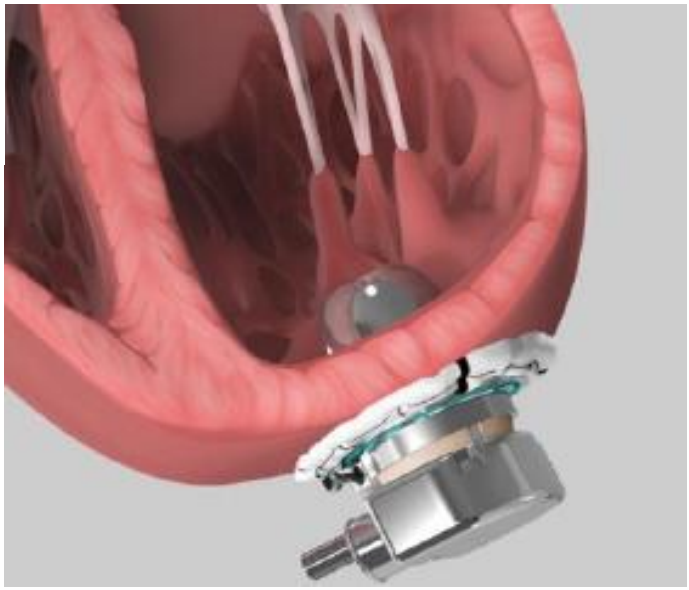

New York Heart Association (NYHA) Classifications
Class I Symptoms
Class II Symptoms
Class III Symptoms
Class IV
End-Stage
Well
Moderate
Dead

Heart Transplantation

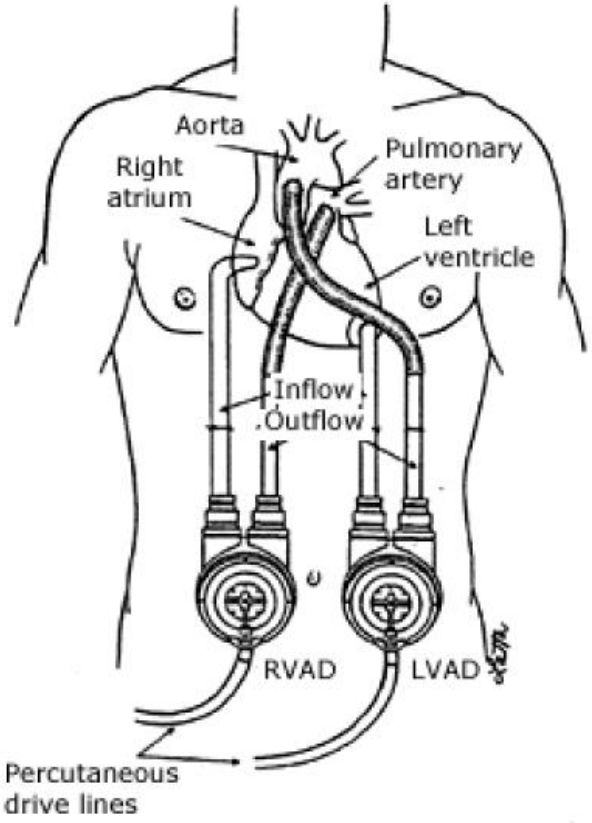
- Orthotopic cardiac transplantation remains the definitive therapy for terminal heart failure
- 5-year survival of 70%,
- 10-year survival of 60%,
- Markedly improved quality of life
- Donor organ availability has remained static even as the waiting list for heart transplant grows

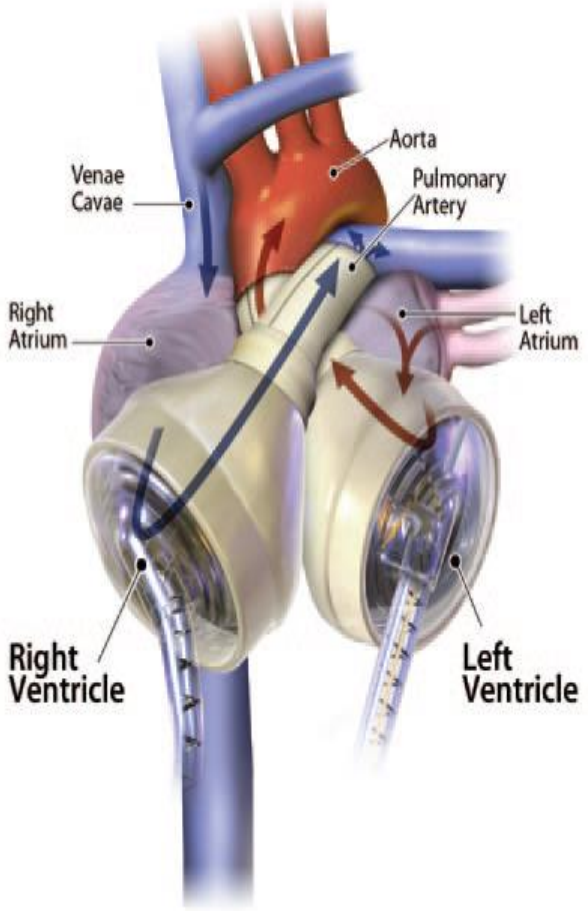



A Pulsatile-Flow LVAD
Aorta
External battery pack
Left ventricle
Skin entry site
External system controller
Percutaneous lead
Pulsatile-flow LVAD
One-way outflow valve (closed)
Blood-pumping chamber
Pump housing
Flexible diaphragm
One-way inflow valve (open)
Blood flow
Percutaneous lead
Actuator bearing
Motor
Pusher plate
B Continuous-Flow LVAD
Continuous-flow LVAD
To aorta
From left ventricle
Motor
Pump housing
Outlet stator and diffuser
Percutaneous lead
Blood flow
Rotor
Inlet stator and blood-flow straightener



BiVAD


Aorta
Right atrium
Pulmonary artery
Left ventricle
Inflow
Outflow
RVAD
LVAD
Percutaneous drive lines


Aorta
Venae Cavae
Pulmonary Artery
Right Atrium
Left Atrium
Right Ventricle
Left Ventricle

SaudiHF

جمعية القلب السعودية
Saudi Heart Association

THANK YOU