



**Brigham and Women's Hospital**  
Founding Member, Mass General Brigham

# Heart Failure Management

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**Deputy Editor, *JACC: Heart Failure***



# Akshay S. Desai MD, MPH



- **Medical School:** Harvard Medical School
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- **Cardiovascular Fellowship:** Brigham & Women's Hospital
- **Heart Failure Fellowship:** Brigham & Women's Hospital
- **Director, Cardiomyopathy and Heart Failure Program, Cardiovascular Division, Brigham and Women's Hospital**
- **Professor of Medicine, Harvard Medical School**
- **Clinical focus:** Management of Advanced Heart Failure, Cardiac Transplantation
- **Research focus:**
  - Optimization of Heart Failure Disease Management
  - Clinical Trials of Novel Heart Failure Therapies
  - Management of Heart Failure with Preserved EF
  - Remote Monitoring

# Disclosures

- **Dr. Desai has been a paid consultant to Abbott, AstraZeneca, Alnylam, Avidity Biopharma, Axon Therapeutics, Bayer, Biofourmis, Boston Scientific, GlaxoSmithKline, Medpace, Medtronic, Merck, New Amsterdam Pharma, Novartis, Parexel, Regeneron, River2Renal, Roche, scPharmaceuticals, Verily, Veristat, and Zydus and has received research support from Abbott, Alnylam, AstraZeneca, Bayer, Novartis, and Pfizer.**

# **Learning Objectives**

- **Discuss clinical diagnosis and taxonomy of HF**
- **Outline approach to diagnosis and evaluation of heart failure**
- **Apply evidenced-based therapy for heart failure and reduced EF, incorporating recent guideline updates**
- **Review updates in management of HFpEF**

# What is 'Heart Failure'?

*Clinical syndrome characterized by abnormalities of left ventricular function and neurohormonal regulation, accompanied by effort intolerance, fluid retention, and reduced longevity*

## Typical Symptoms



Fatigue  
Effort Intolerance  
Exertional Dyspnea



Orthopnea  
Paroxysmal Nocturnal Dyspnea  
Recumbent Cough



Lower Extremity Edema  
Abdominal Distension



Unexplained Weight gain

## Typical Signs

Jugular Venous Distension  
Pulmonary Rales  
S3 Gallop/LV heave  
Hepatomegaly  
Peripheral Edema

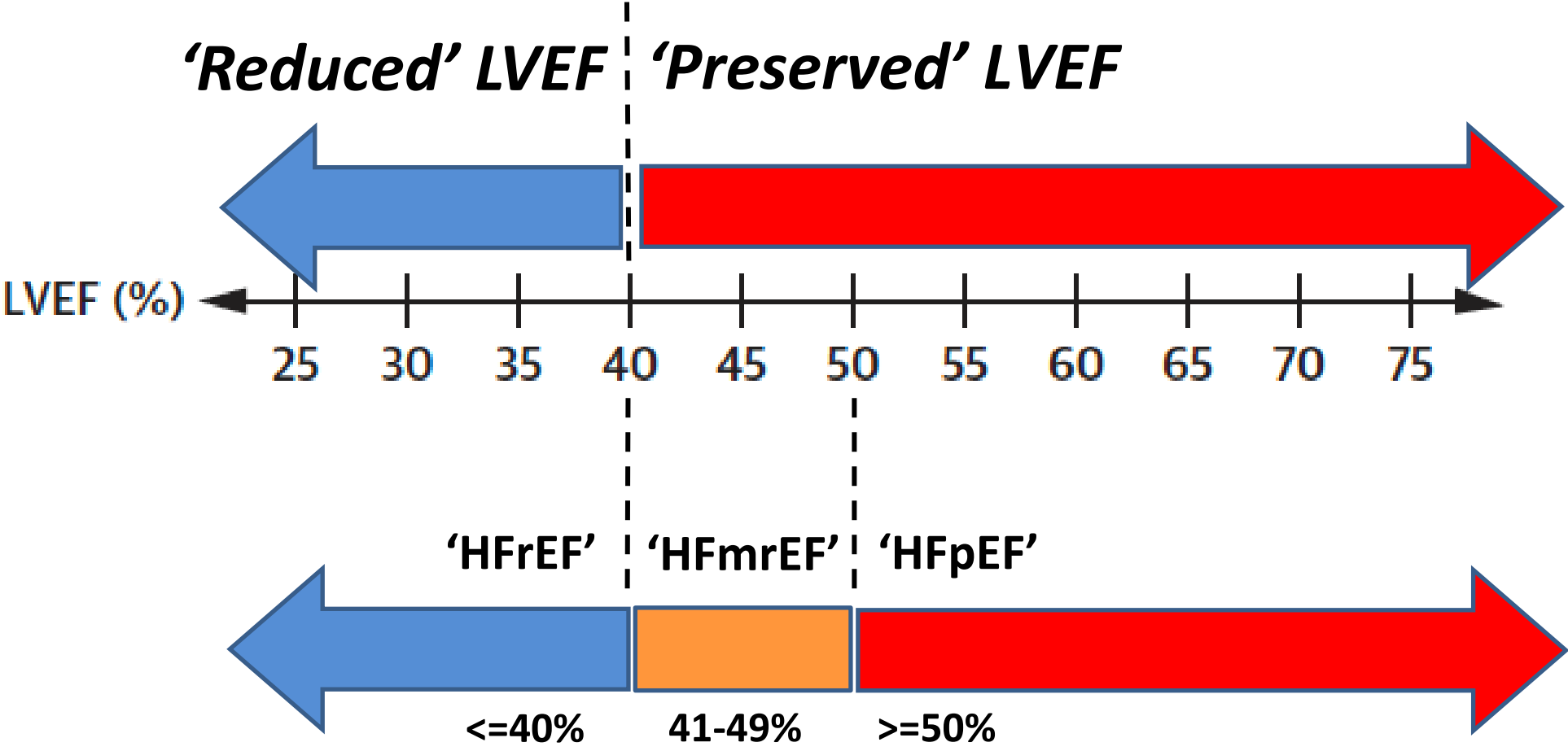
Cardiomegaly  
Pulmonary edema  
'B-lines' on lung U/S



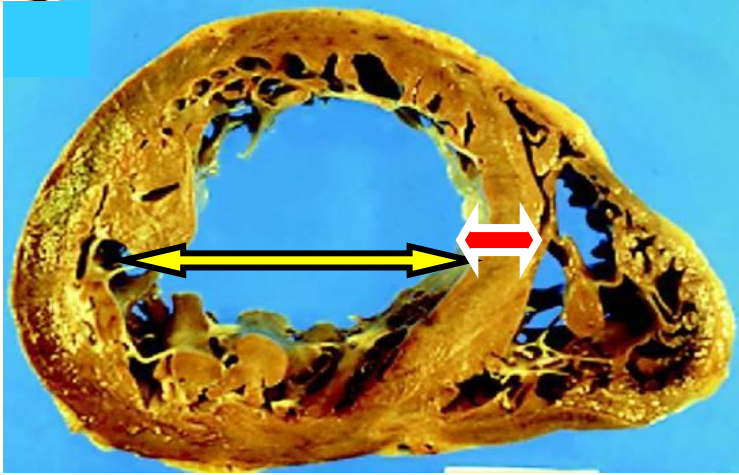
Over 6  
million  
Americans  
have HF

Leading Cause  
of  
Hospitalization  
in People 65+

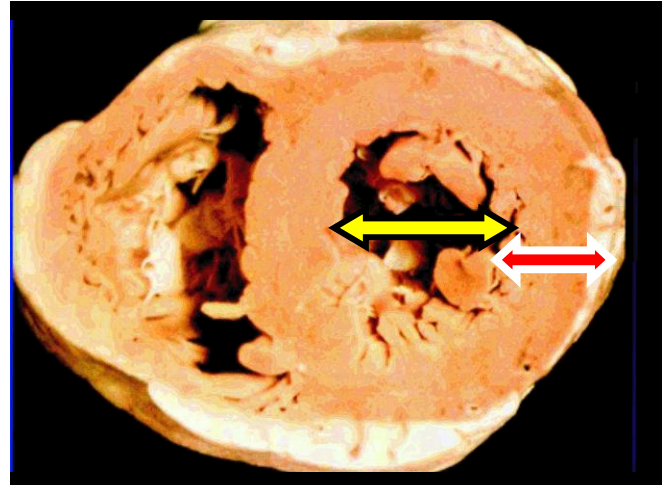
# Classification of HF by LVEF



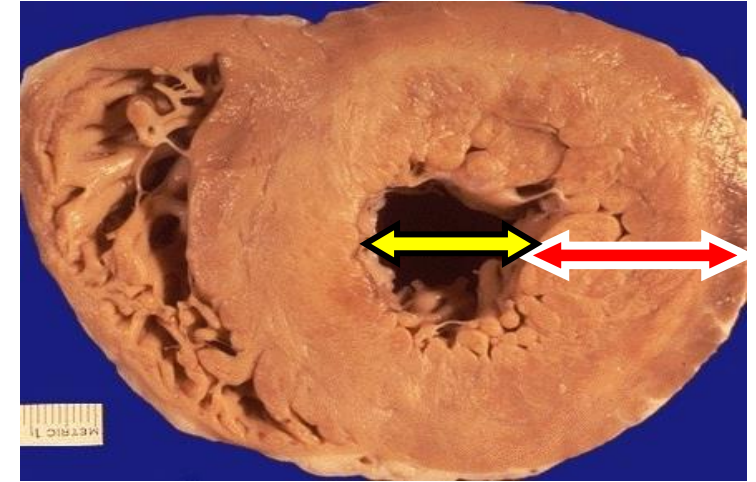
# Pathology of HF by EF



HF-Reduced EF



normal



HF-PEF

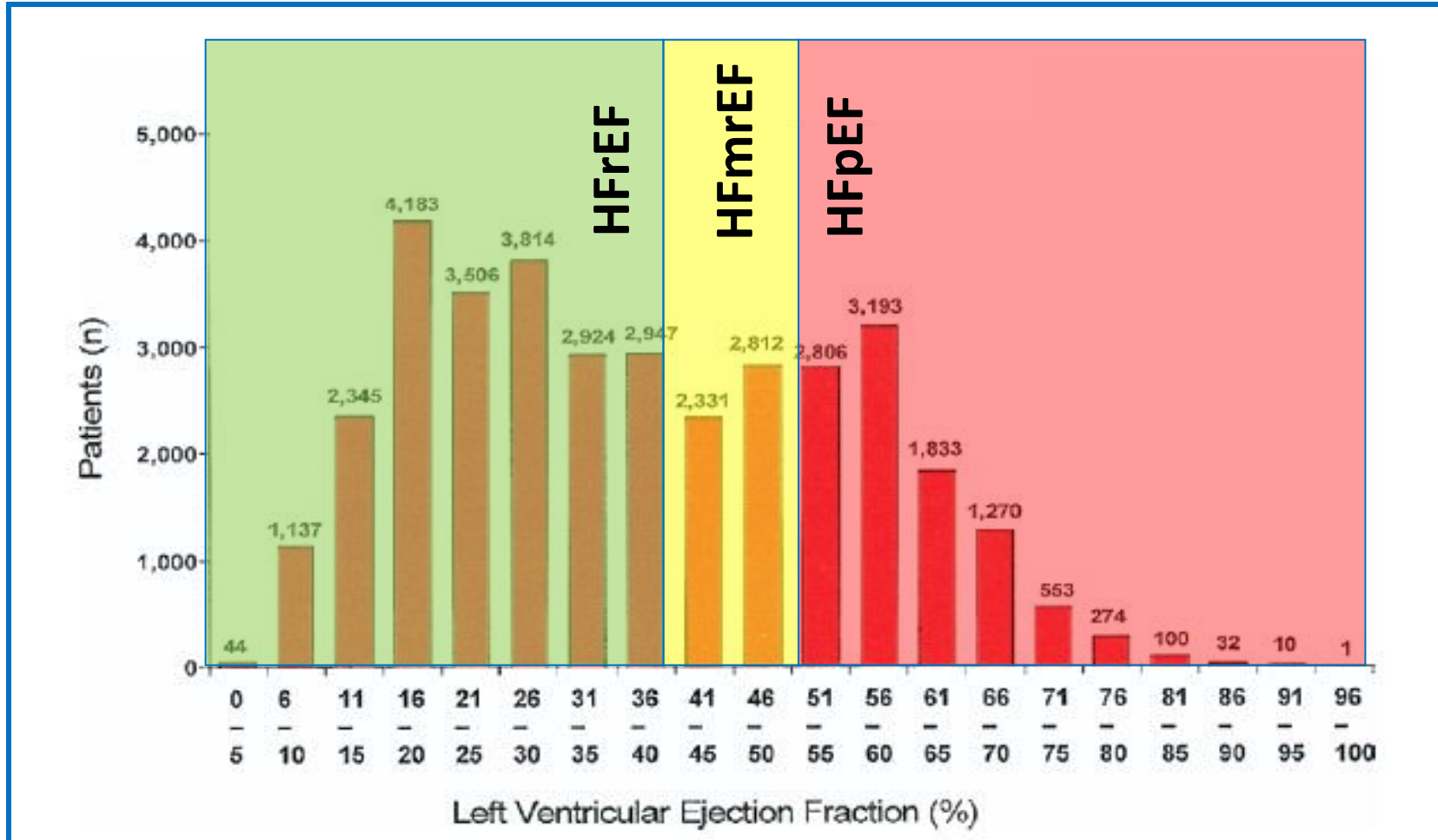
## **Eccentric** Remodeling

↔ Wall Thickness  
↑ Volume  
↑ Volume / Mass

## **Concentric** Remodeling

↑ Wall Thickness  
↔ Volume  
↓ Volume / Mass

# Distribution of HF by EF in Hospital



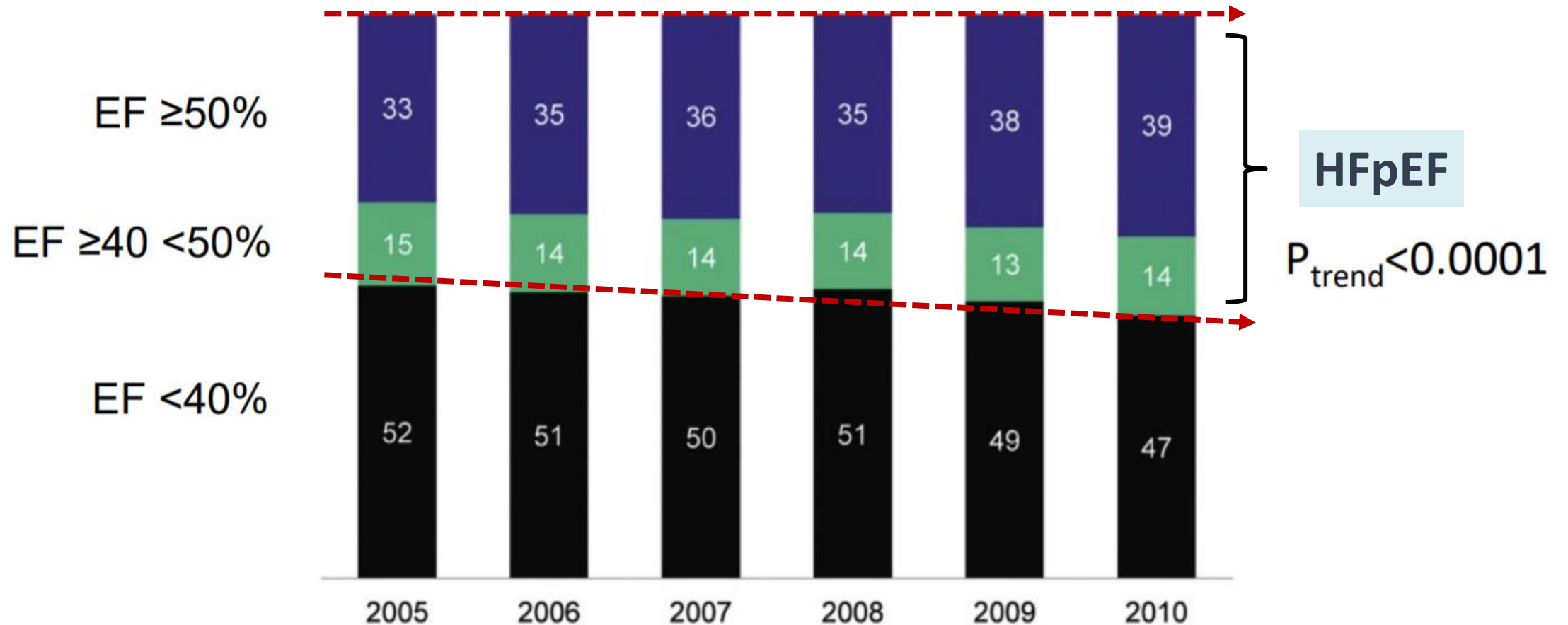
## HF-PEF vs. HFrEF

- Older
- Higher BMI
- More Women
- More HTN
- More CKD
- Less CAD

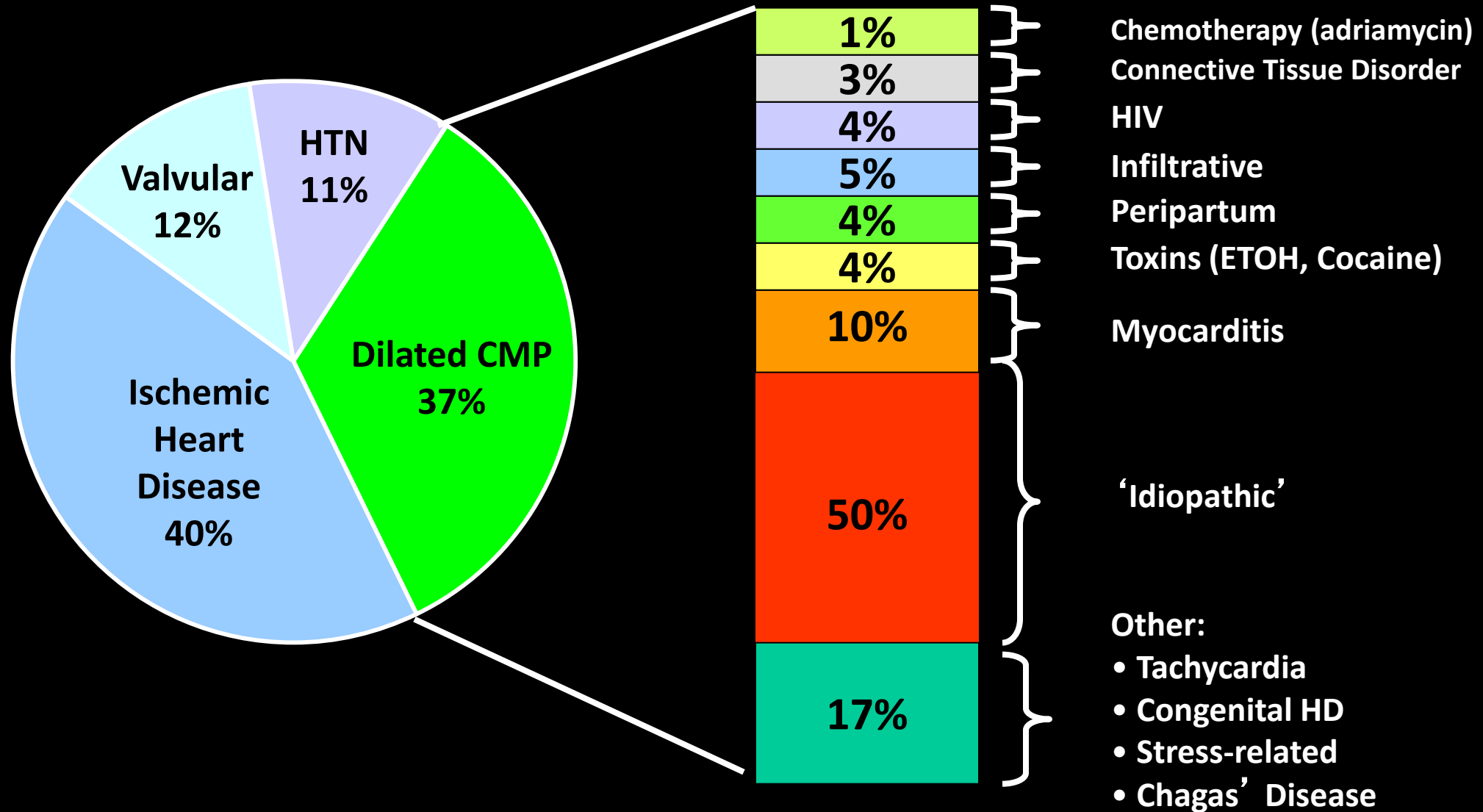
## HFmrEF resembles HFrEF

# Prevalence of HFpEF is increasing

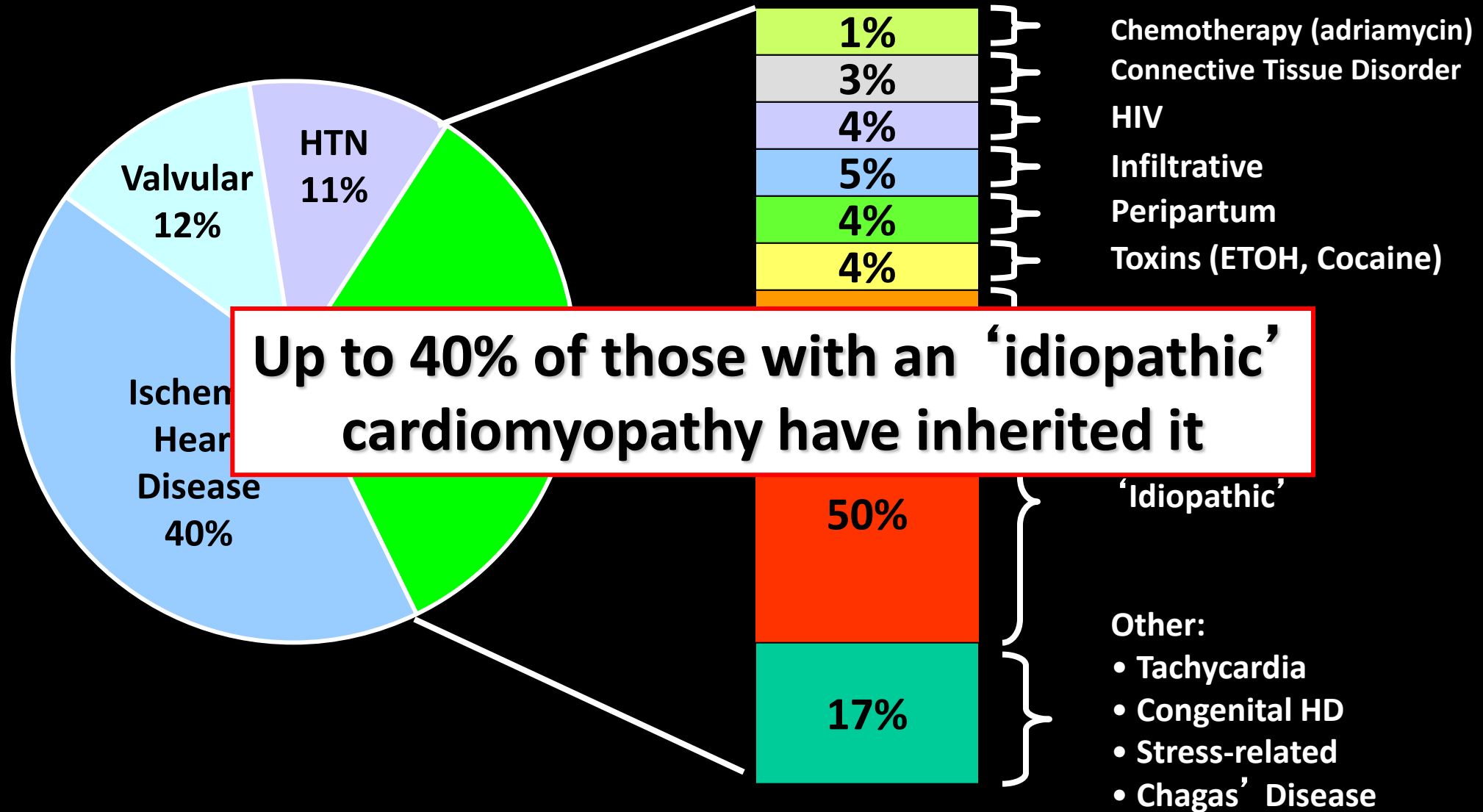
Patients hospitalized with heart failure (“Get With The Guidelines”)



# Causes of Heart Failure with Reduced EF



# Causes of Heart Failure with Reduced EF



# Workup of New HF Diagnosis

## Always

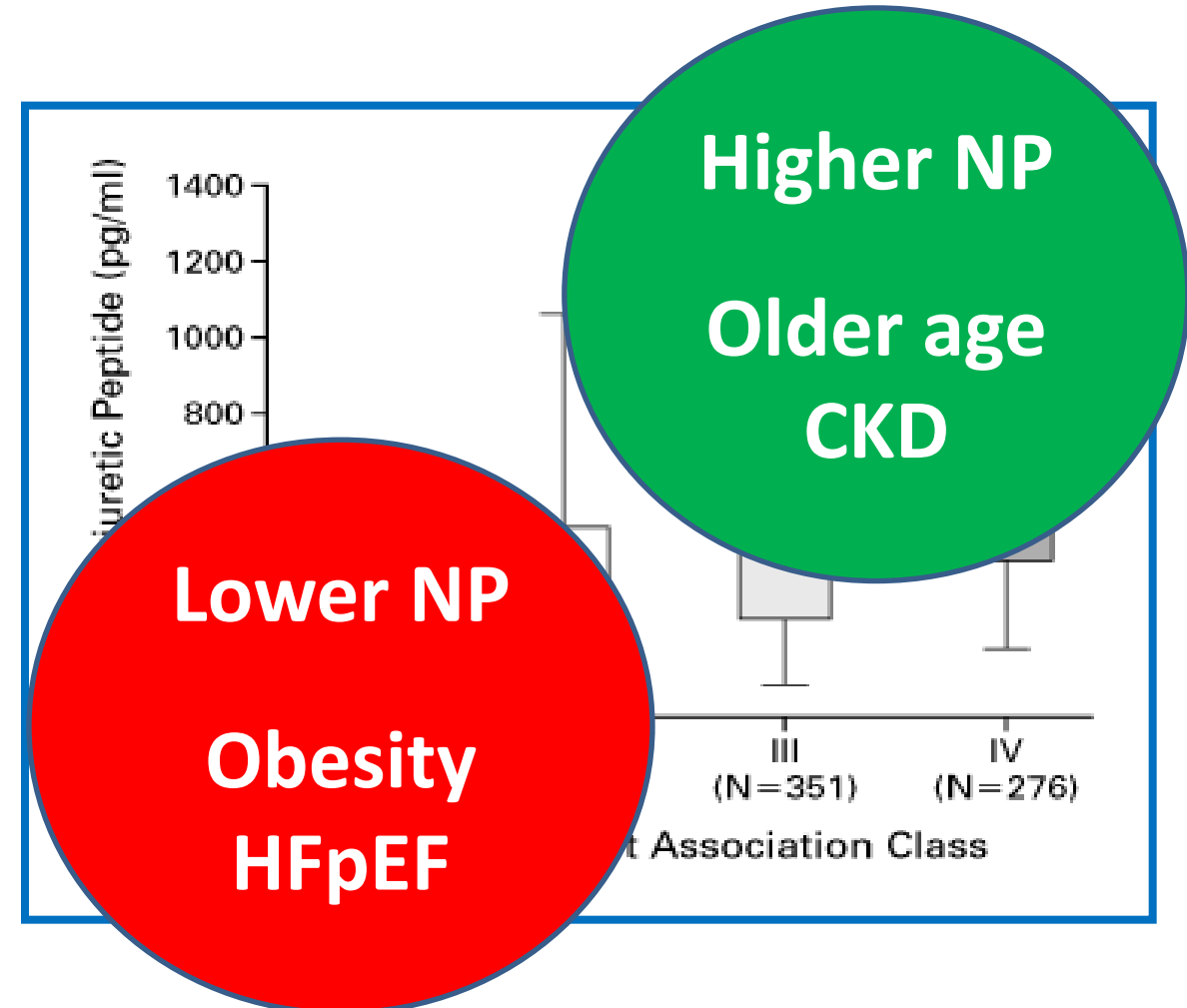
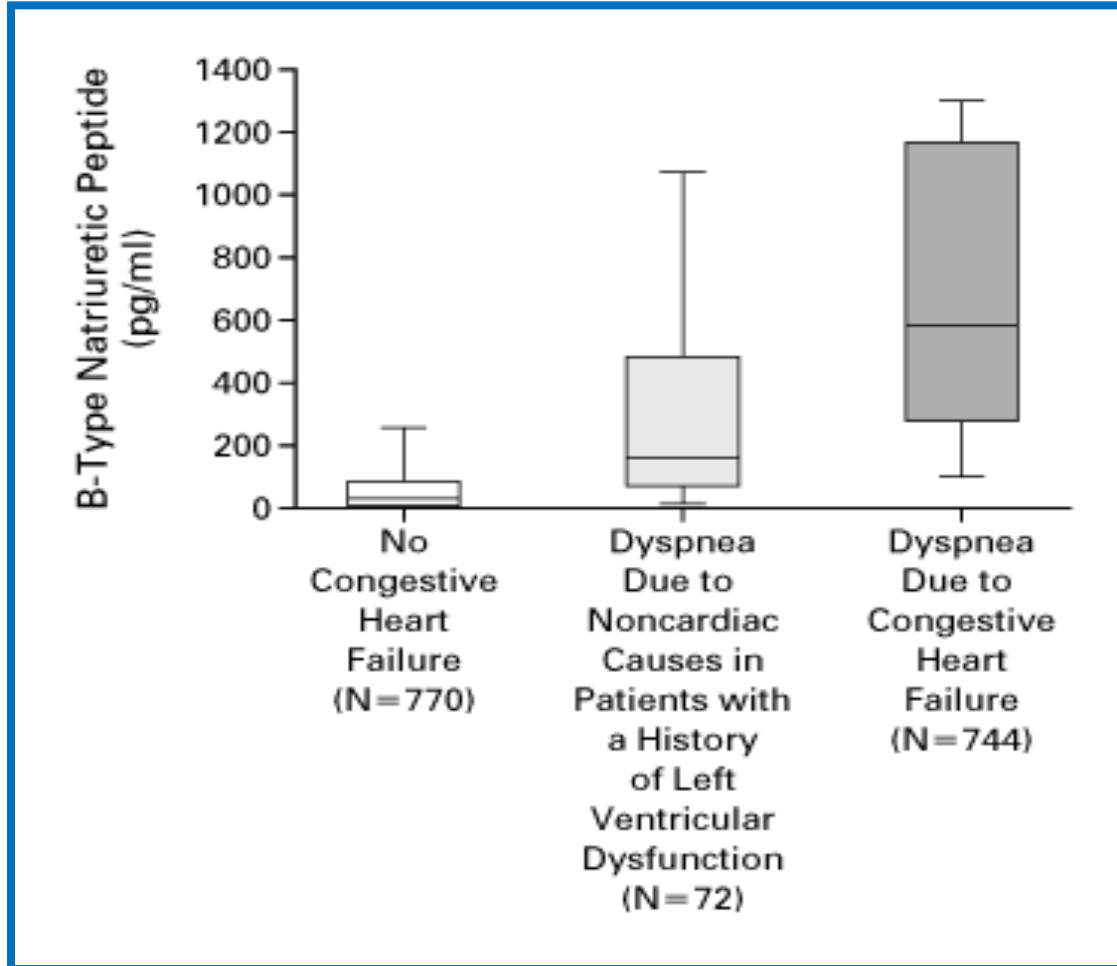
- History (including FHx)
- Physical Exam
- EKG
- Echocardiography
- Labs
  - Dx: TSH, SPEP/UPEP, ferritin, tox screen, troponin
  - Px: Na, Cr, BNP/NTproBNP
- Functional Capacity Assessment
- CAD assessment

## Sometimes

- Cardiac Catheterization/Angiography
- Advanced Cardiac Imaging
  - Cardiac CT(A): CAD, LV thrombus
  - MRI : Myocarditis, infiltrative disease
  - Nuclear:
    - Myocardial perfusion (SPECT/PET): CAD
    - FDG-PET: Inflammation (sarcoidosis)
    - Tc-99m PYP : ATTR Amyloidosis
- Genetic testing
- Endomyocardial biopsy

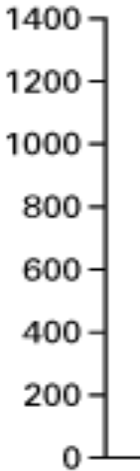
# Natriuretic Peptides (BNP/NTproBNP)

*1586 pts presenting to EW with dyspnea*



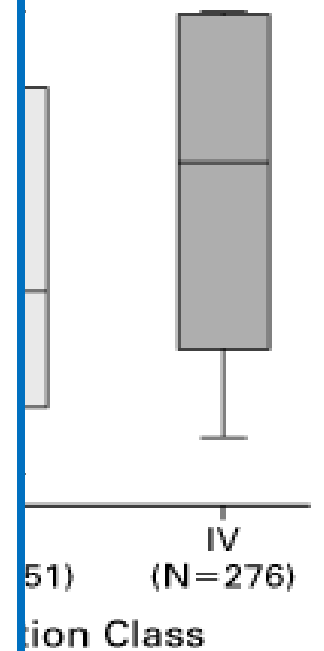
# Natriuretic Peptides (BNP/NTproBNP)

B-Type Natriuretic Peptide  
(pg/ml)



**BNP  $\geq 100$  pg/mL:**  
**Positive Predictive Value 79%**  
**Negative Predictive Value 89%**

**NT-pro BNP  $\geq 900$  pg/mL:**  
**Positive Predictive Value 77%**  
**Negative Predictive Value 92%**



# Functional capacity is the key determinant of prognosis in HF

## NYHA Classification

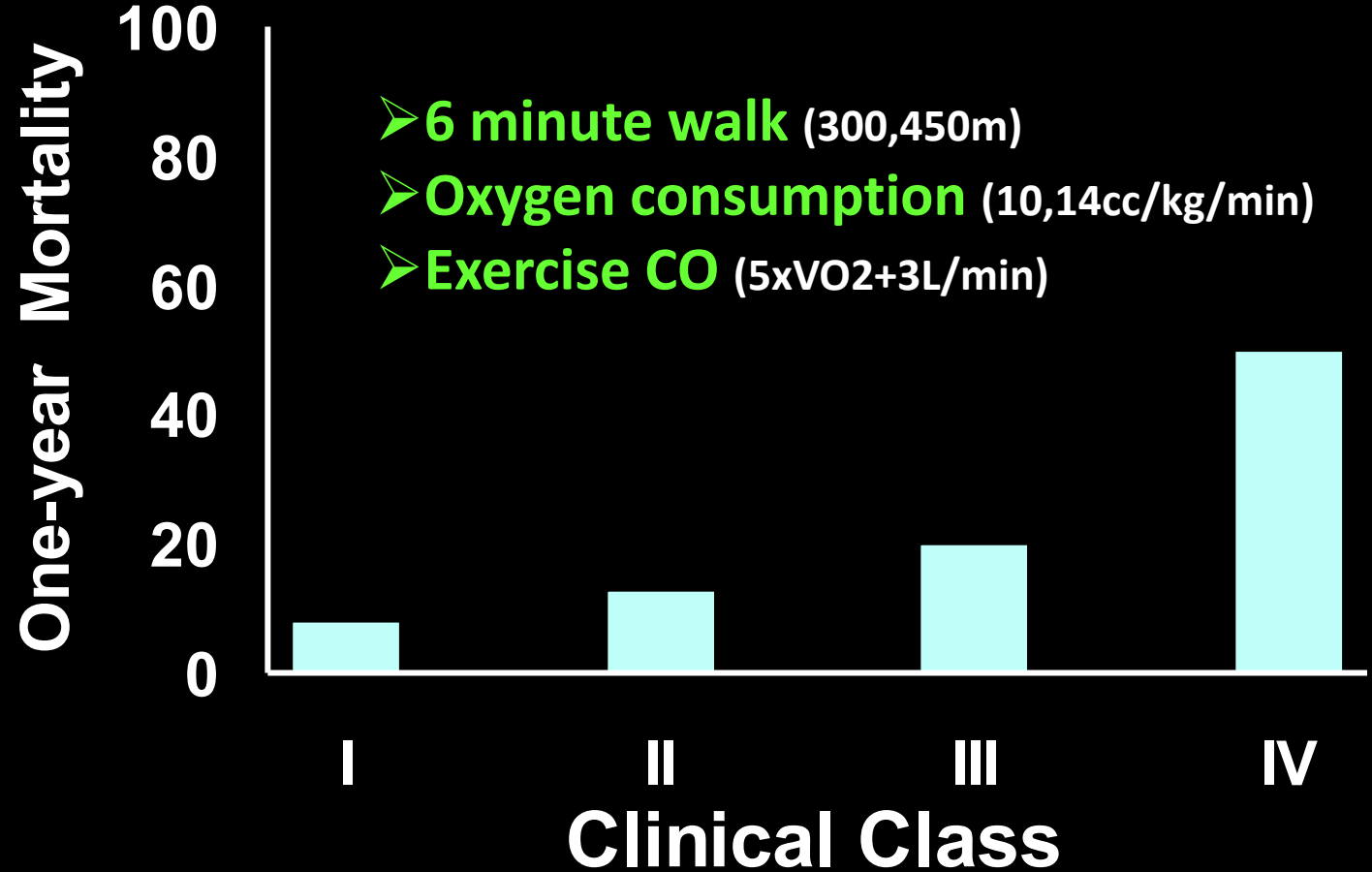
I. Cardiac disease without functional limitation

II. Slight limitation of physical activity

III. Marked limitation of physical activity

IV. Inability to carry on physical activity without discomfort

Worsening QOL

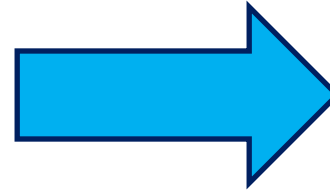


# Goals of HF Treatment

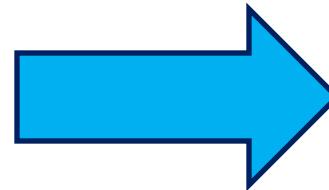
- Relieve Symptoms

- Slow Disease Progression

- Prevent Sudden Death



- **Decongestion**
- Disease Management
- **Pharmacologic Therapy**
- Revascularization
- Management of Valve Dz
- Management of AF
- CRT/LV pacing

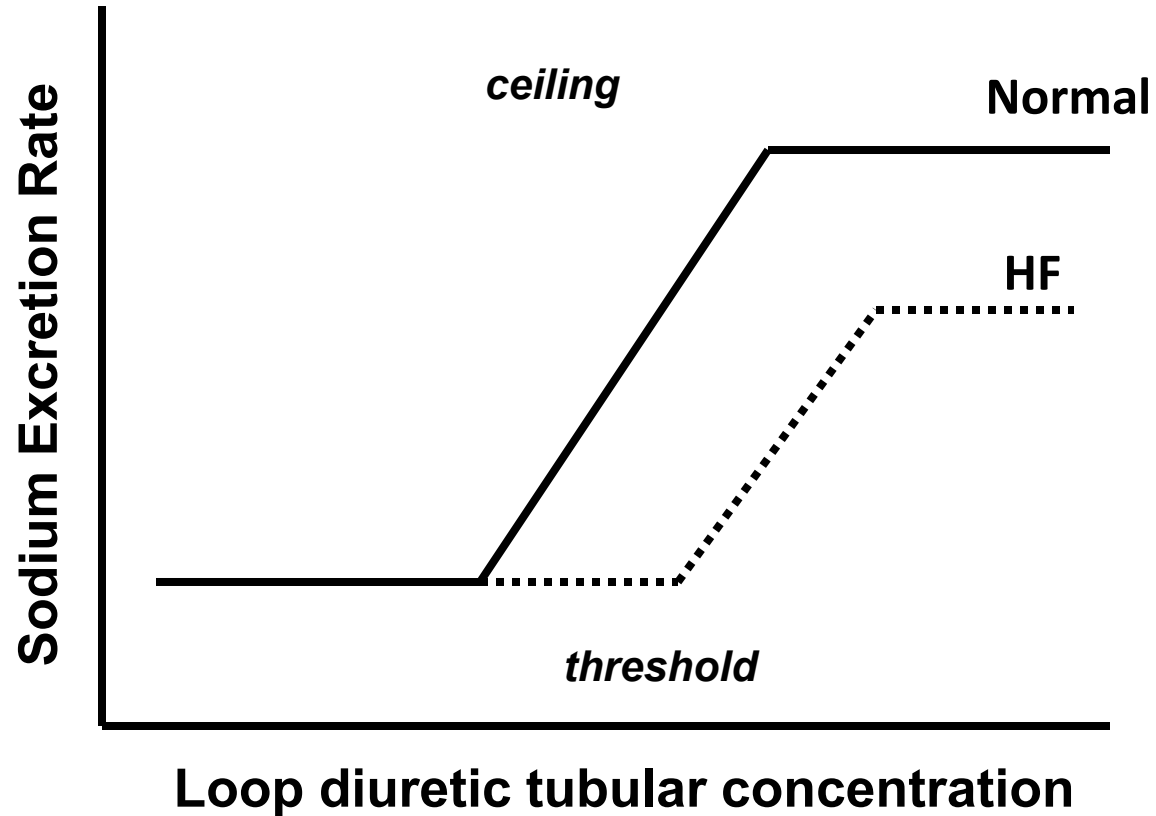


- ICD implantation
- Management of VT

# Diuretics for Heart Failure

|                             | Examples                                                     | Maximum Effect (% of filtered Na load) | Site of action in nephron              |
|-----------------------------|--------------------------------------------------------------|----------------------------------------|----------------------------------------|
| Proximal Tubule Diuretics   | Acetazolamide<br><b>SGLT2i</b>                               | 3-5%                                   | Proximal Tubule                        |
| Loop Diuretics              | <b>Furosemide,</b><br><b>Bumetanide,</b><br><b>Torsemide</b> | 20-25%                                 | Thick ascending limb of Loop of Henle  |
| Thiazide Diuretics          | <b>HCTZ, metolazone</b>                                      | 5-8%                                   | Early distal tubule                    |
| Potassium-Sparing Diuretics | <b>Spironolactone,</b><br>amiloride                          | 2-3%                                   | Late Distal tubule and collecting duct |

# Loop Diuretic Pharmacodynamics



- Use an adequate initial dose
- Avoid overdosing
- More frequent administration of effective doses
- Combination diuretic therapy for diuretic resistance

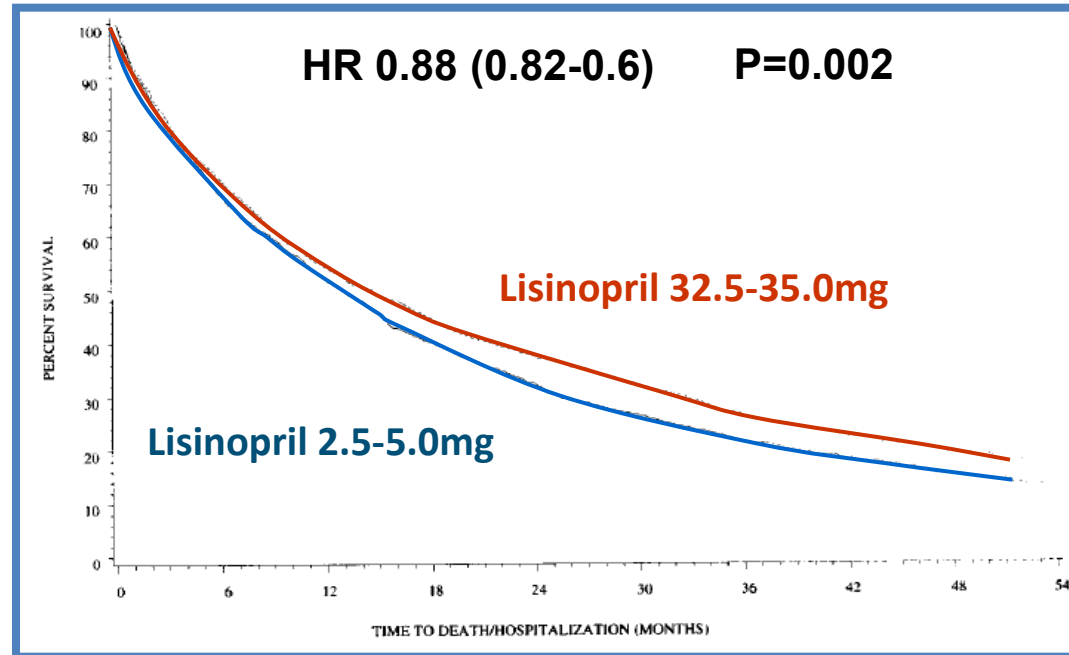
# Outcome Trials of ACE Inhibitors in Heart Failure

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|                    | <u>Patients</u> | <u>NYHA Class</u> | <u>Placebo Mortality</u> | <u>Hazard ratio</u> |                                                                                  |
|--------------------|-----------------|-------------------|--------------------------|---------------------|----------------------------------------------------------------------------------|
| <b>V-HeFT II</b>   | 804             | I-III             | 25%<br>(Hyd/Iso)         | 0.72                |                                                                                  |
| <b>CONSENSUS I</b> | 253             | IV                | 44%                      | 0.66                |                                                                                  |
| <b>SOLVD Tx</b>    | 2569            | II-III            | 40%                      | 0.84                | <i>ARBs provide equivalent benefits in HFrEF and are reasonable alternatives</i> |
| <b>SOLVD Px</b>    | 4228            | I                 | 16%                      | 0.91                |                                                                                  |
| <b>SAVE</b>        | 2231            | Post MI<br>EF<40% | 25%                      | 0.81                |                                                                                  |
| <b>ISIS-4</b>      | 58,050          | 24h post MI       | 7.7%                     | 0.93                |                                                                                  |

# Dosing of ACE/ARB in HFrEF: More is Better

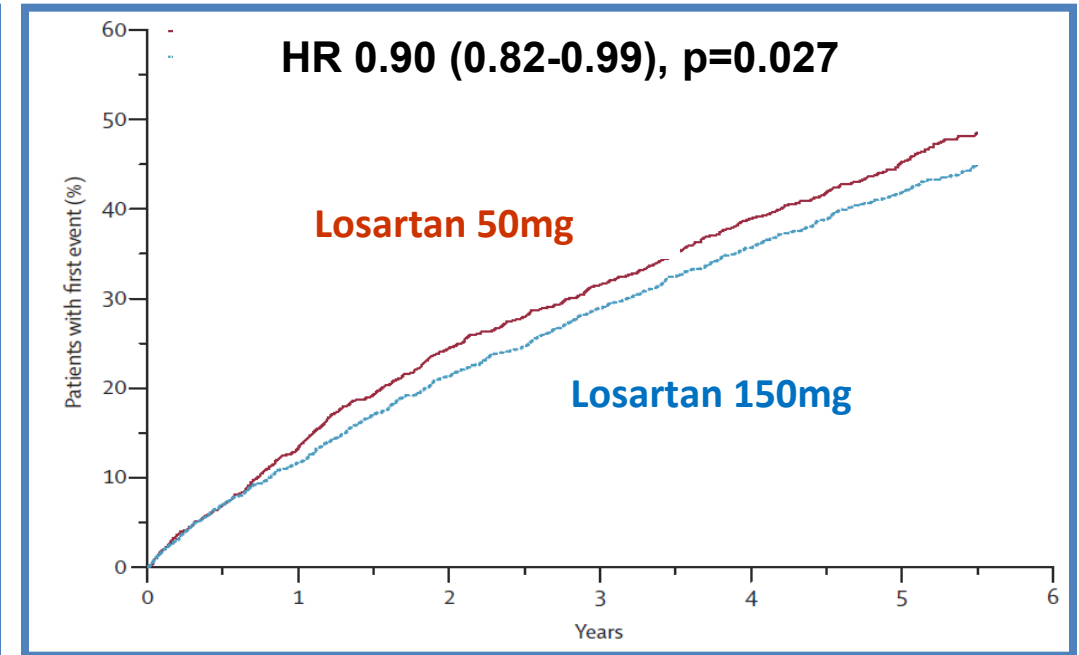
## ATLAS



Time to Death or Hospitalization

Favors High Dose

## HEAAL



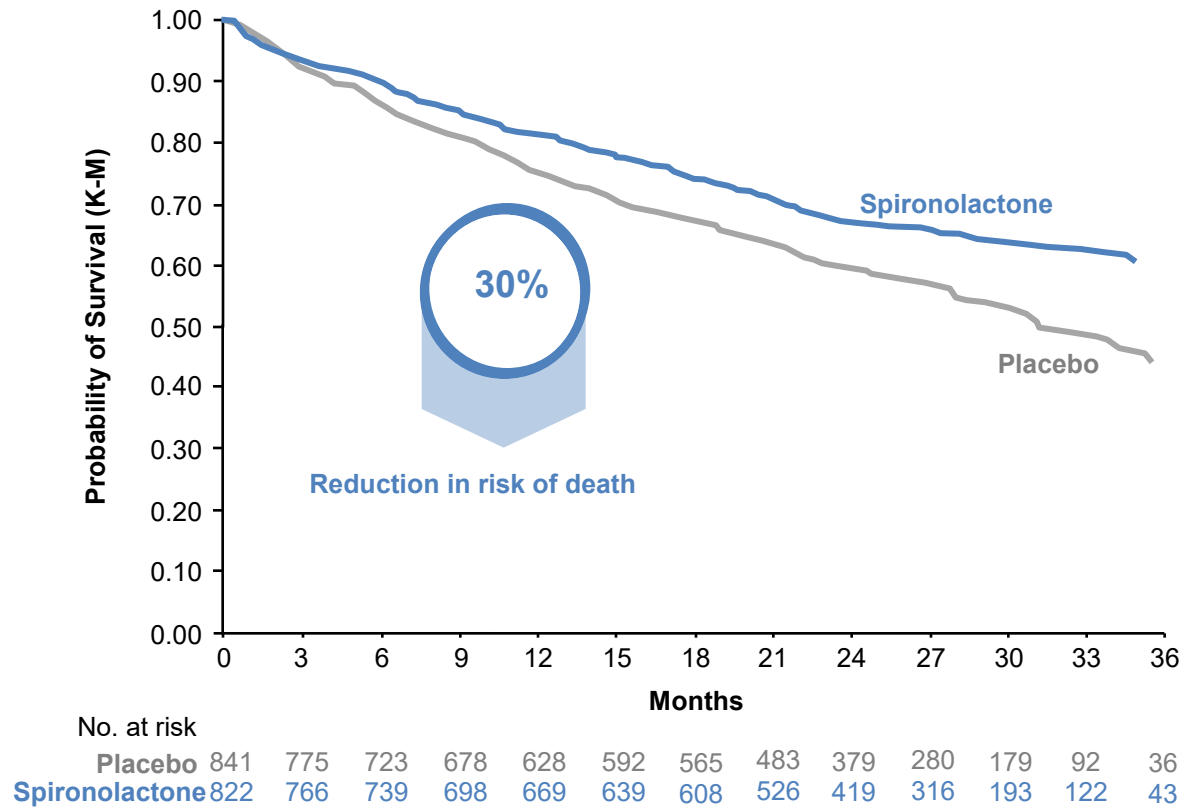
Time to Death or HF Hospitalization

Favors High Dose

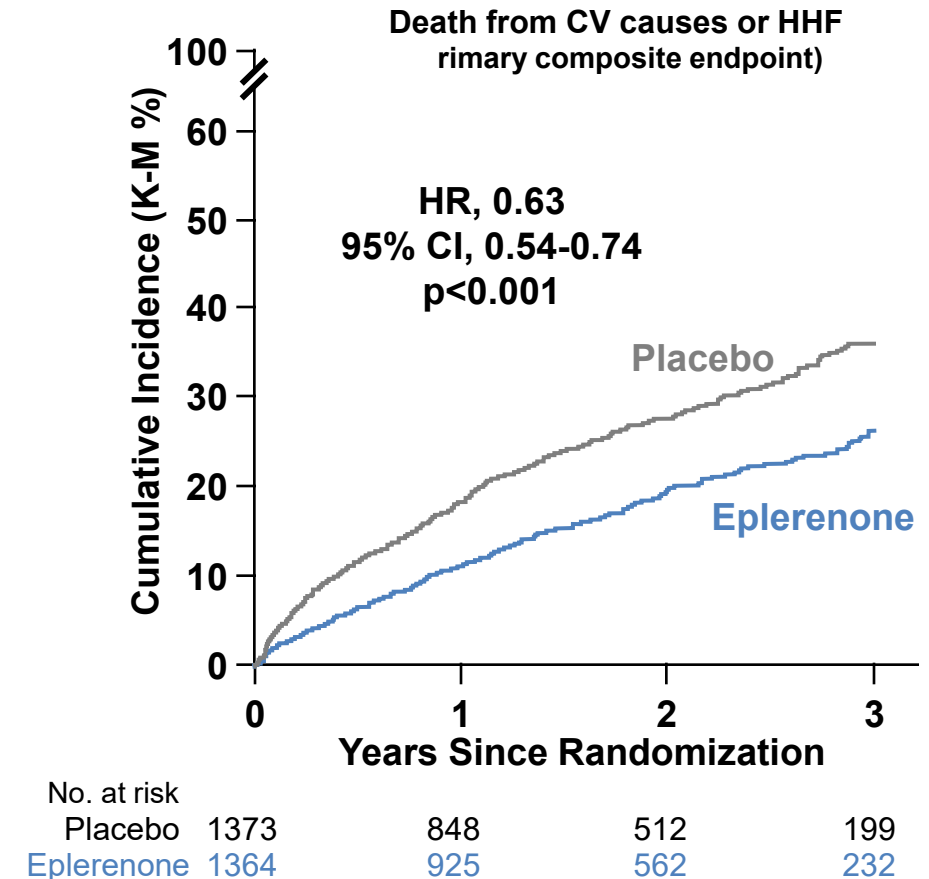
**Titrate as Tolerated to Doses Achieved in Clinical Trials**

# Reduction in CV Death or HFH with MRA in HFrEF

## RALES (NYHA III/IV)



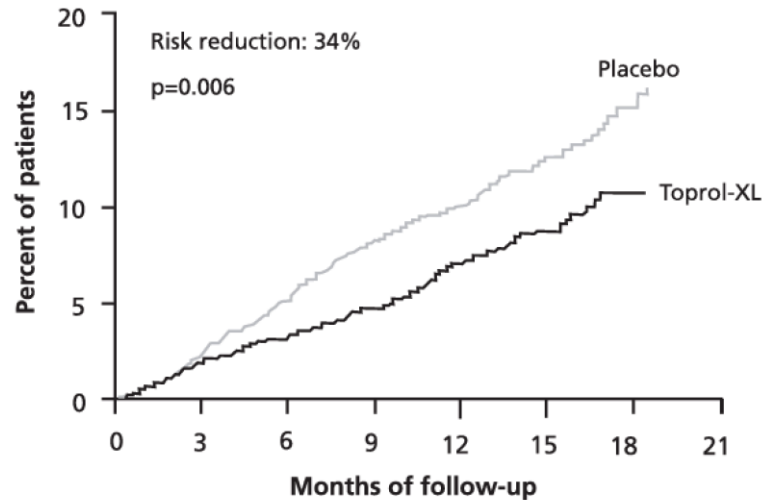
## EMPHASIS-HF (NYHA II)



**Caution with risk of hyperkalemia, particularly in patients at high risk (DM, age, CKD)**

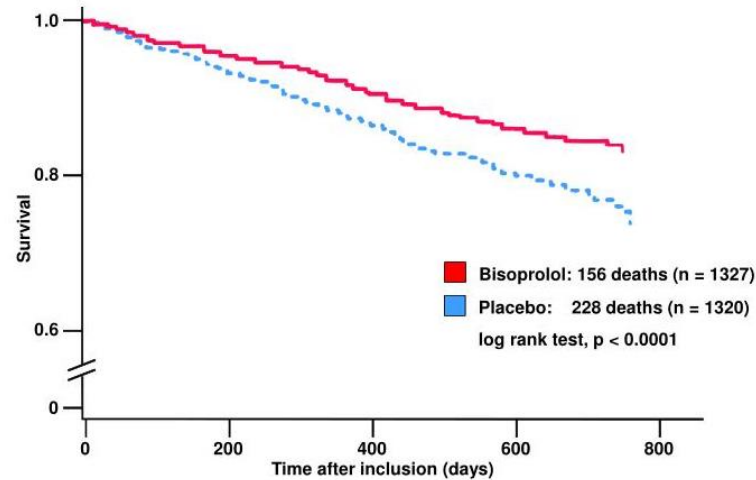
# Beta-Blocker Reduce Mortality in HFrEF

**MERIT-HF  
(Metoprolol Succinate)**



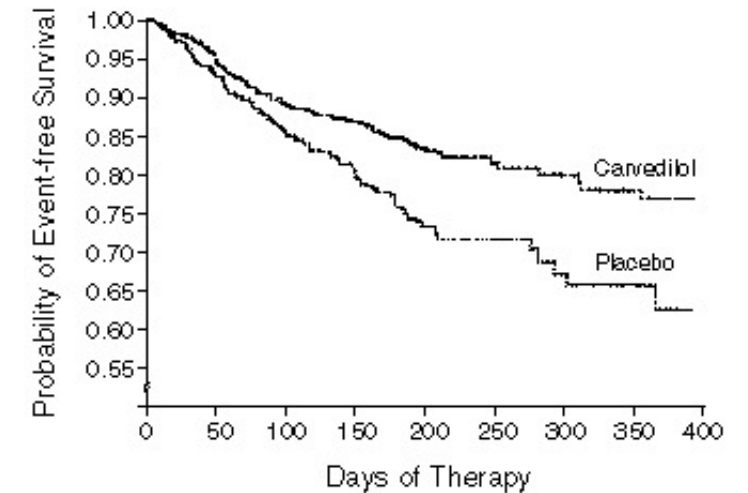
**Mortality ↓ 34%**

**CIBIS-II  
(Bisoprolol)**



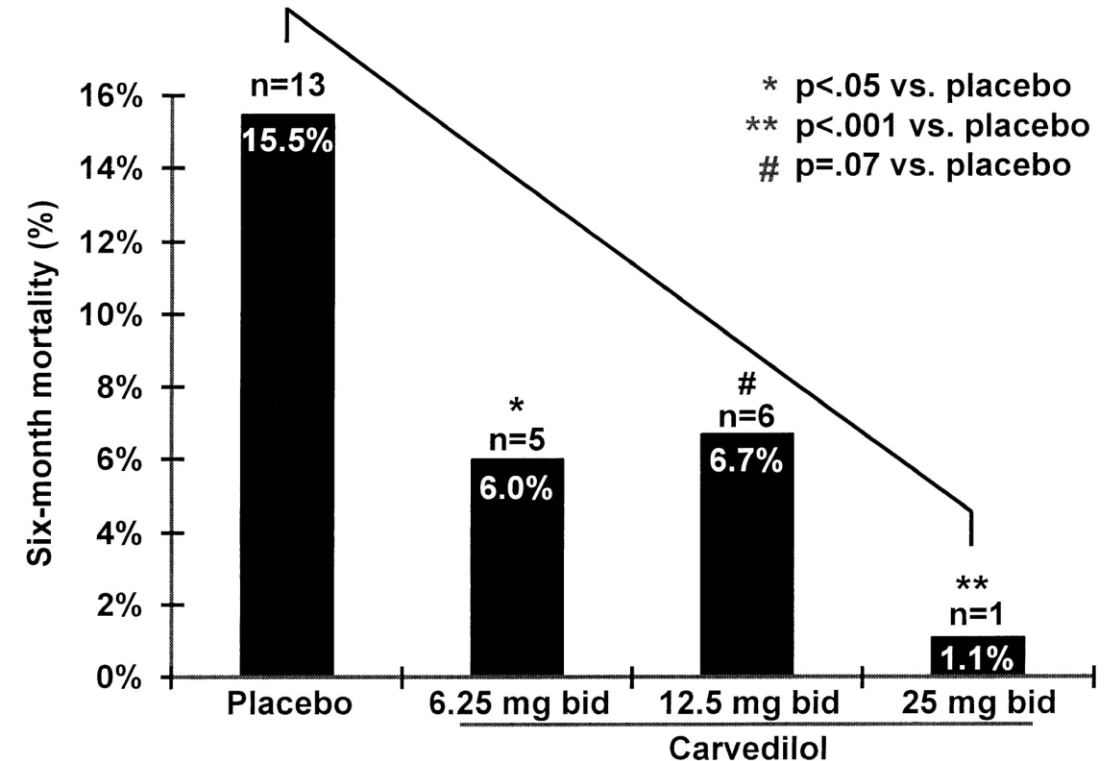
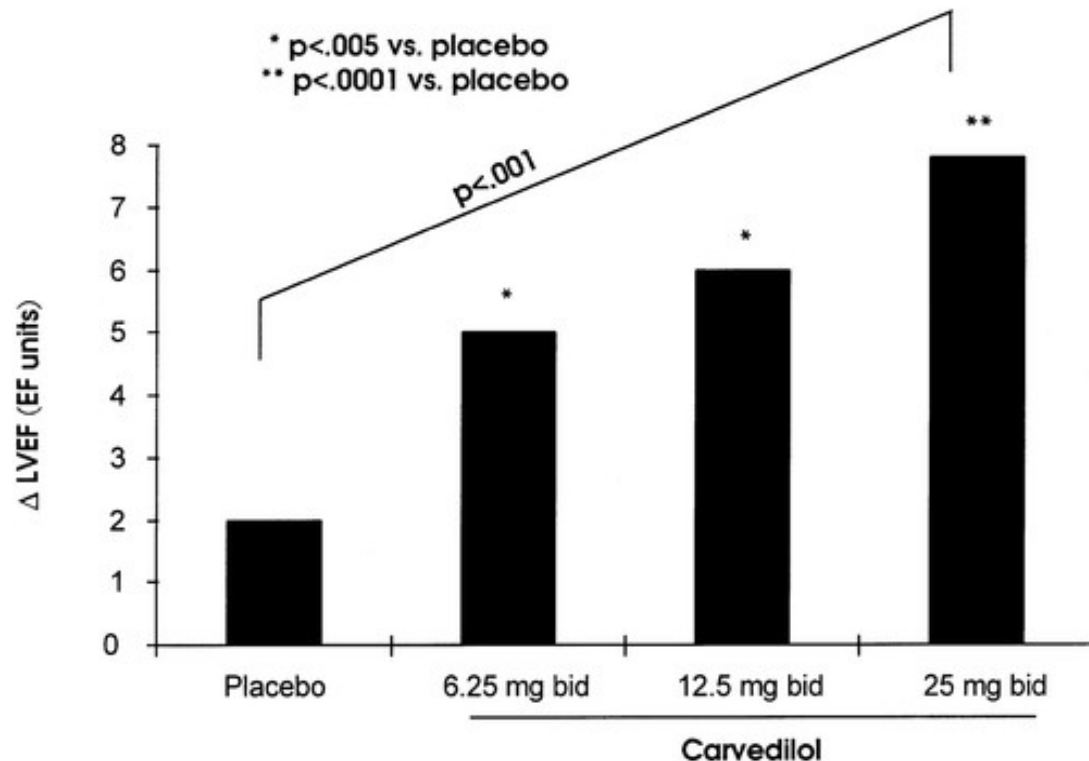
**↓ 34%**

**US Carvedilol Trial  
(Carvedilol)**



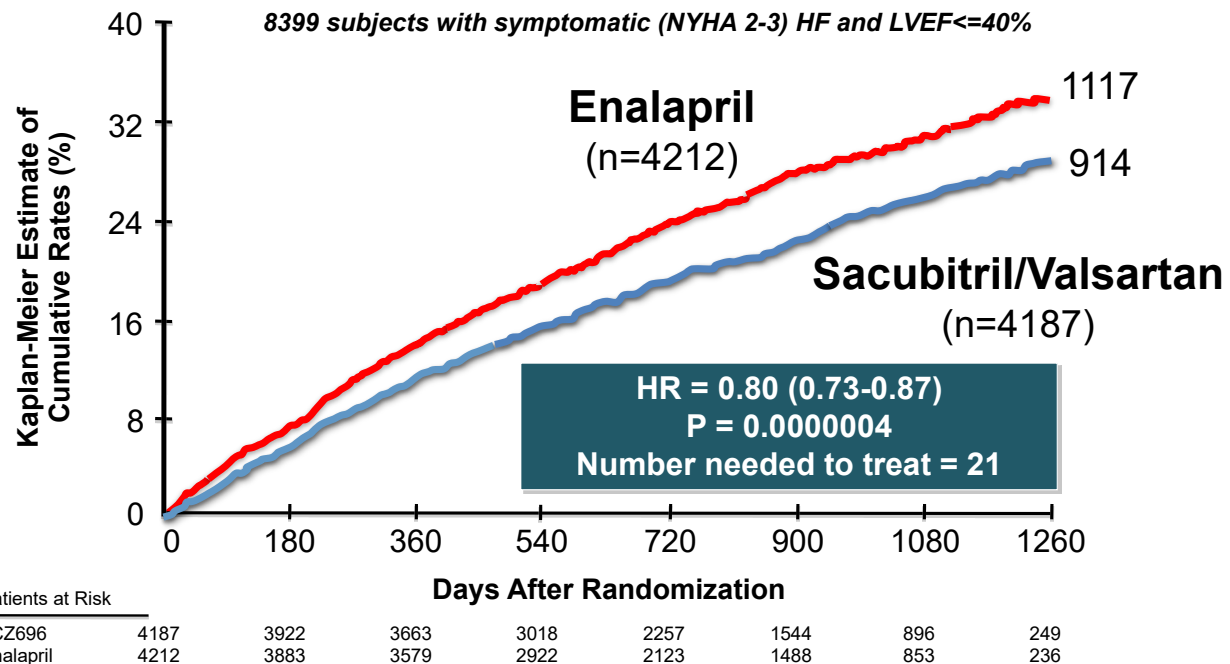
**↓ 65%**

# Dose Dependent Effects of Carvedilol on Remodeling and Mortality (MOCHA)

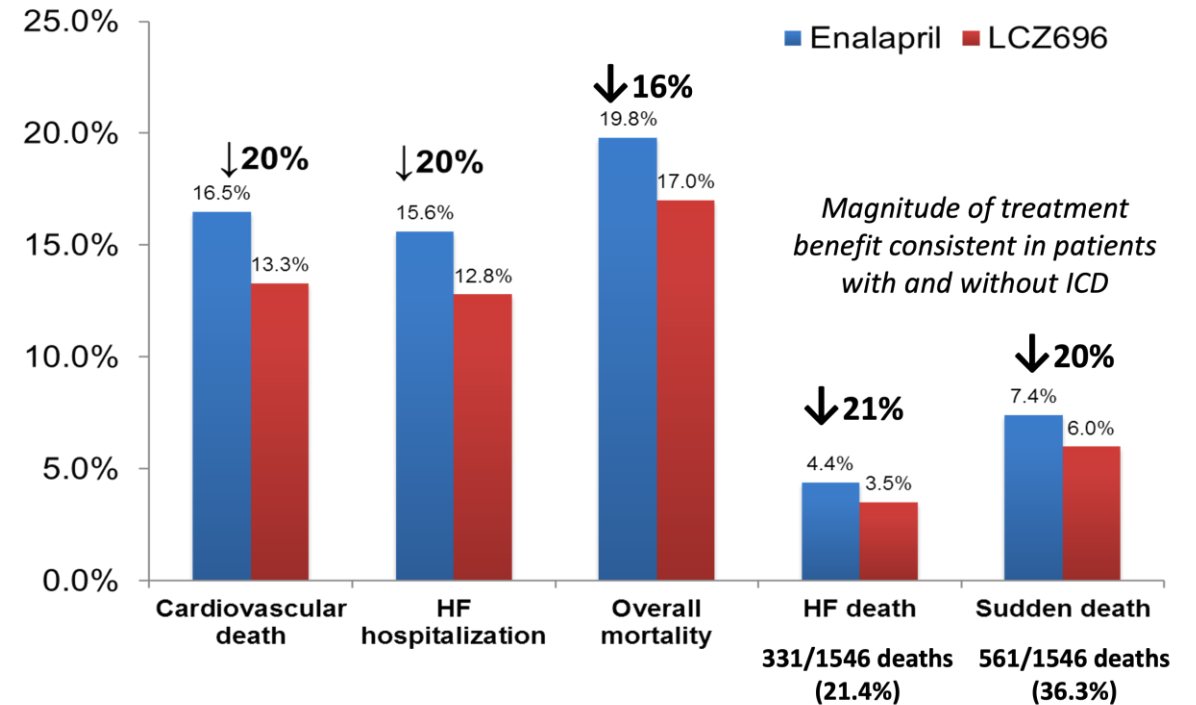


# ARNI for Chronic HFrEF: PARADIGM-HF

## Primary Endpoint: CV Death or HF Hospitalization



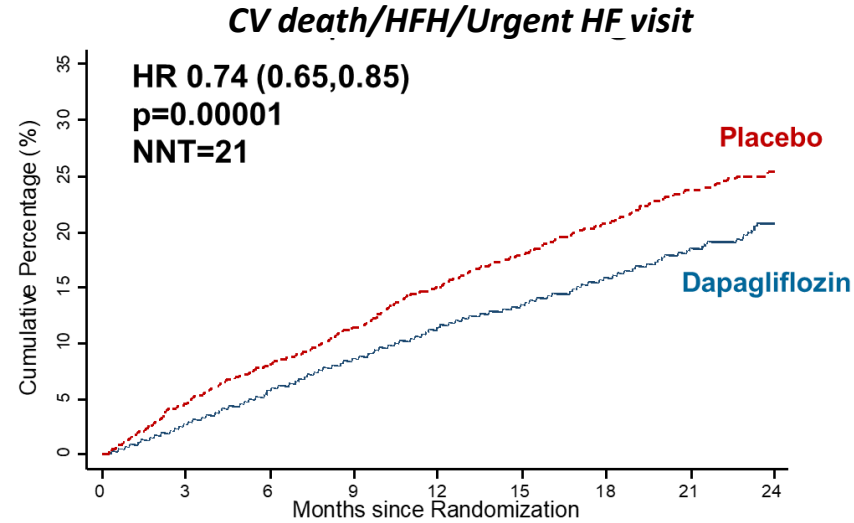
## Secondary Outcomes



# CV Benefits of SGLT2i in HFrEF



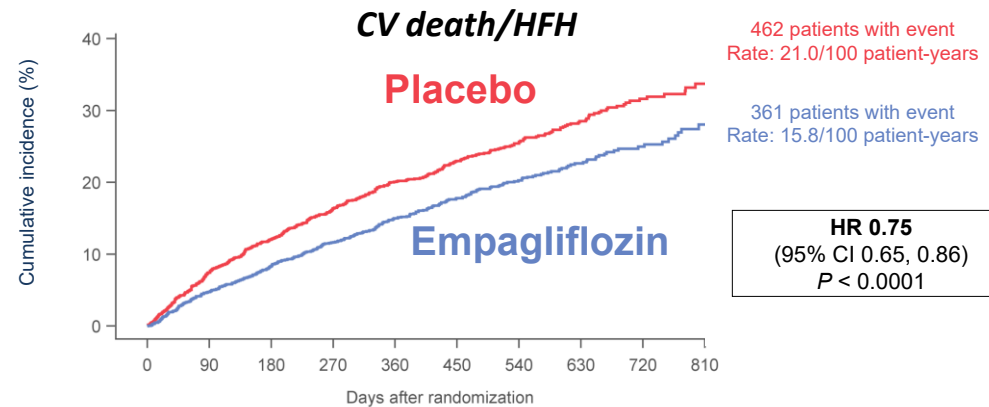
(McMurray JJV, et al. NEJM 2019)



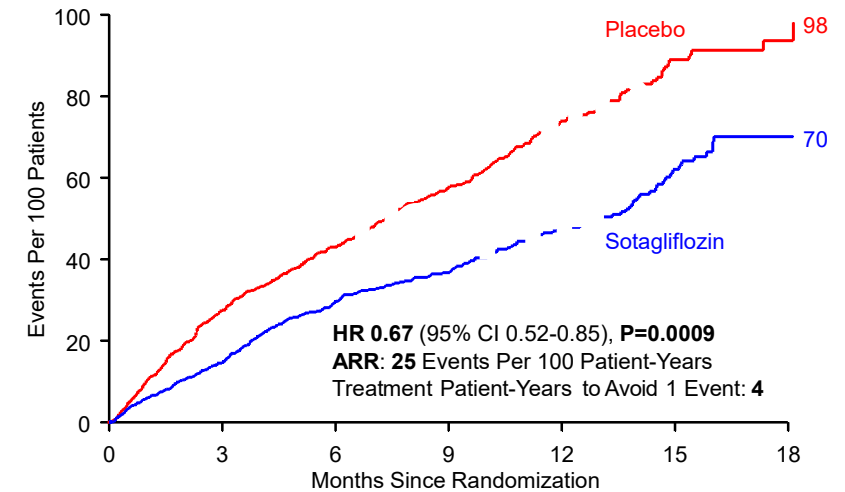
|                |      |      |      |      |      |      |      |     |     |
|----------------|------|------|------|------|------|------|------|-----|-----|
| Number at Risk |      |      |      |      |      |      |      |     |     |
| Dapagliflozin  | 2373 | 2305 | 2221 | 2147 | 2002 | 1560 | 1146 | 612 | 210 |
| Placebo        | 2371 | 2258 | 2163 | 2075 | 1917 | 1478 | 1096 | 593 | 210 |



(Packer M, et al. NEJM 2020)

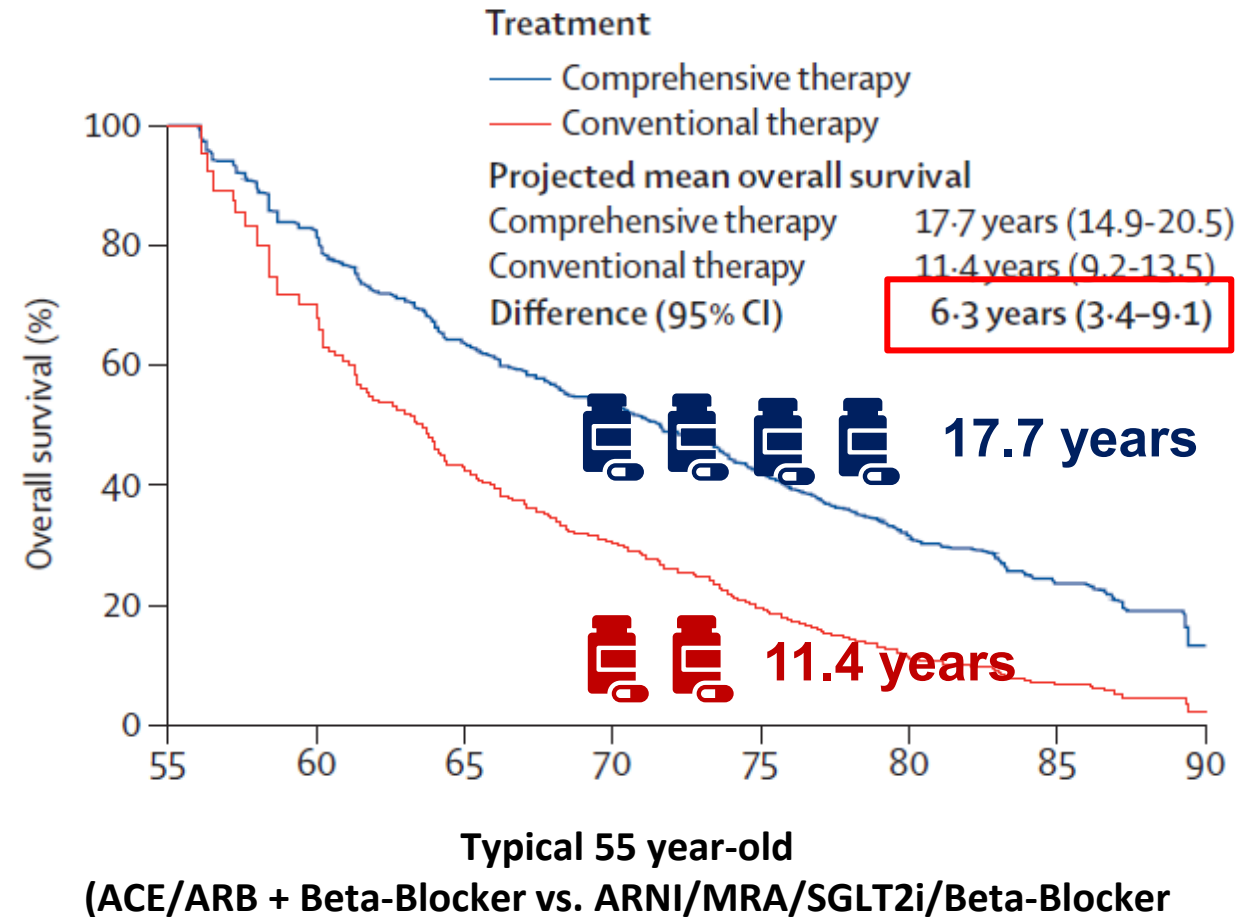
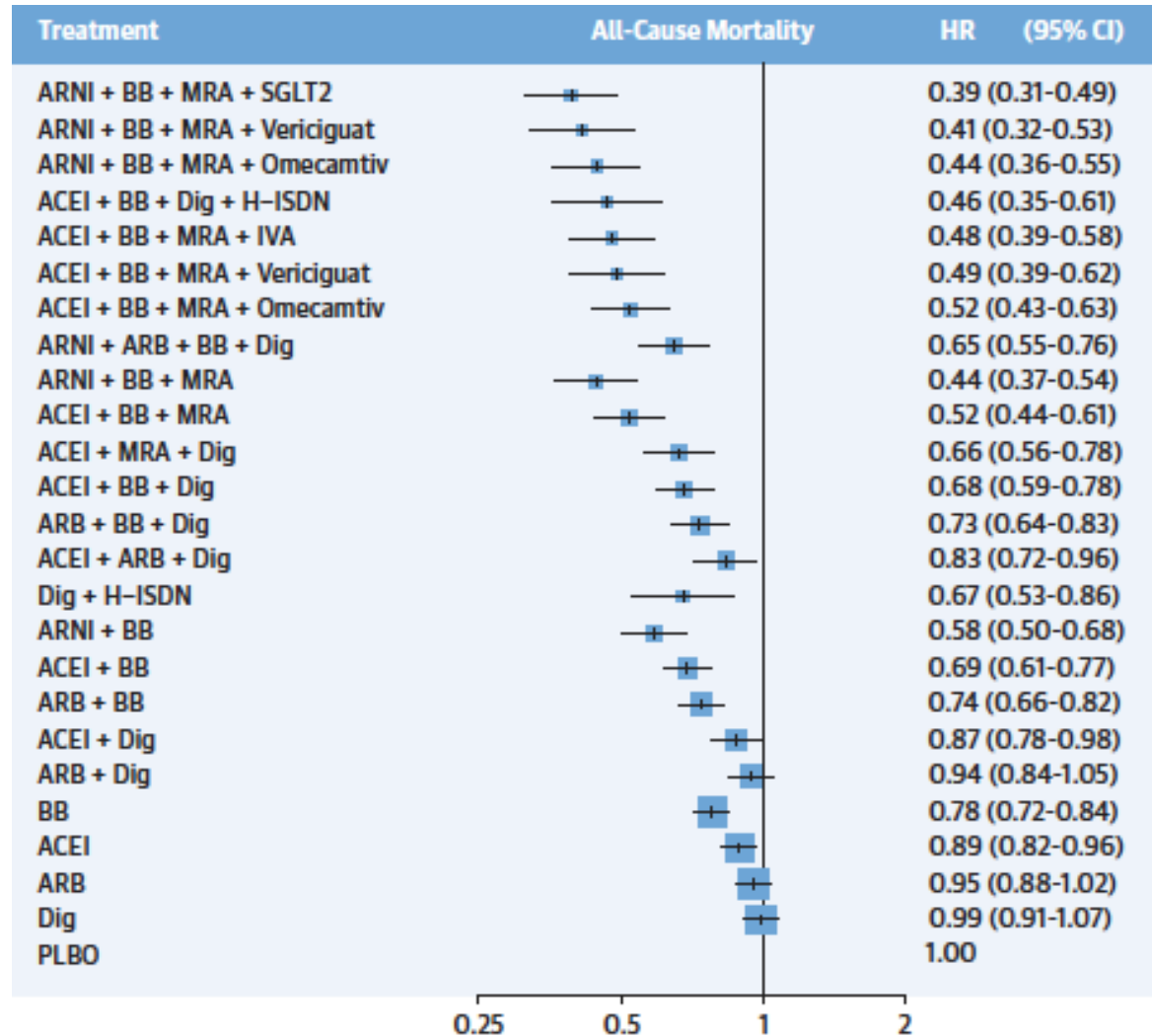


| Patients at risk |      |      |      |      |      |     |     |     |     |     |
|------------------|------|------|------|------|------|-----|-----|-----|-----|-----|
| Placebo          | 1867 | 1715 | 1612 | 1345 | 1108 | 854 | 611 | 410 | 224 | 109 |
| Empagliflozin    | 1863 | 1763 | 1677 | 1424 | 1172 | 909 | 645 | 423 | 231 | 101 |



(Bhatt D, et al. NEJM 2020)

# 'Comprehensive' Medical Therapy for HFrEF Improves Longevity



2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

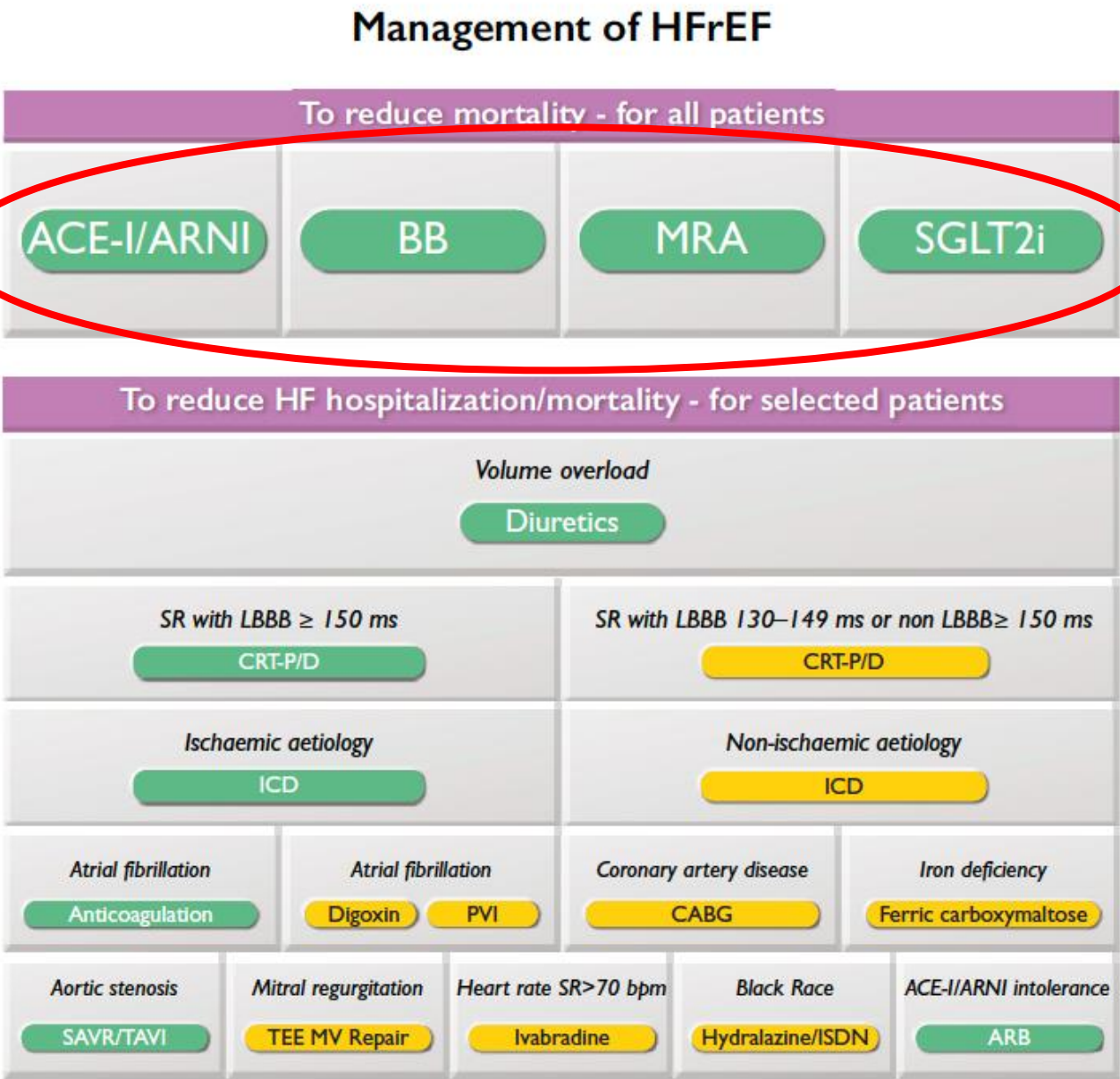
Developed by the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

CLINICAL PRACTICE GUIDELINE: FULL TEXT

2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

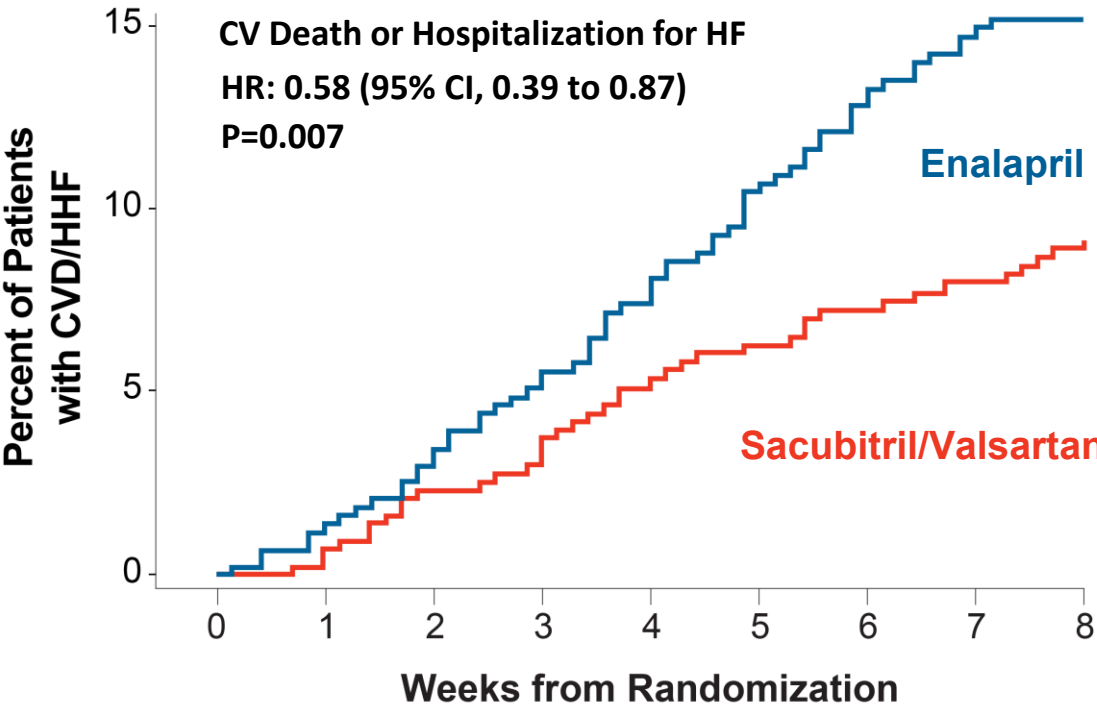
Foundational therapy with 4 ‘Pillars’ targeting 5 mechanisms



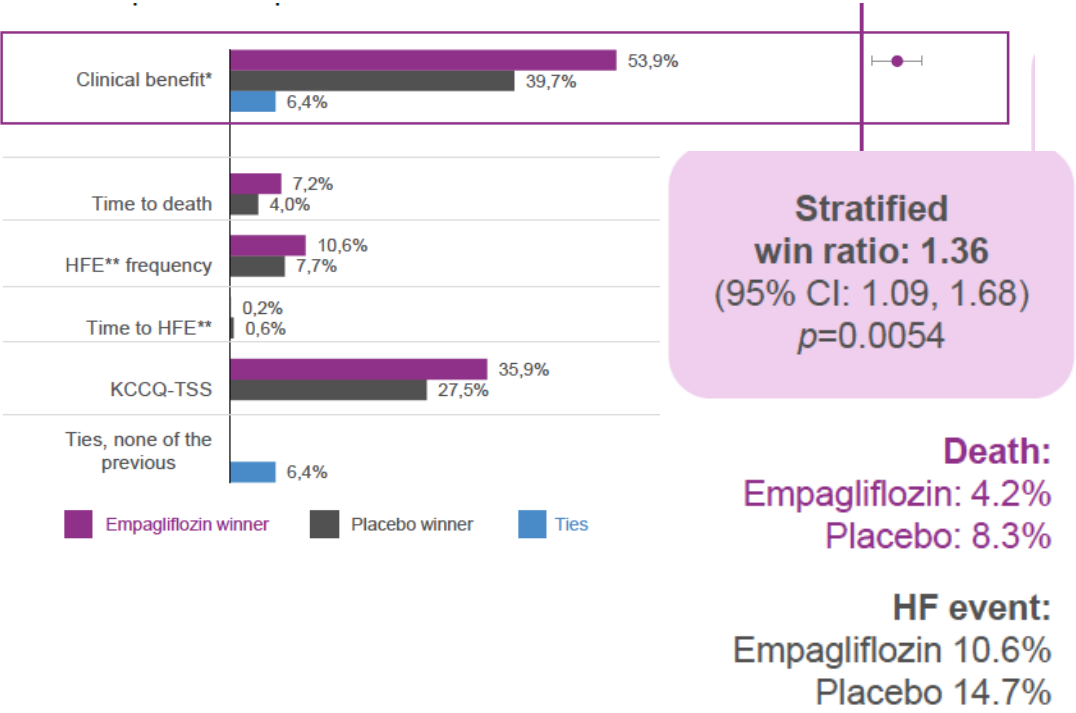
# Predischarge Initiation of Medical Therapy Improves Outcomes in HFrEF



## ARNI

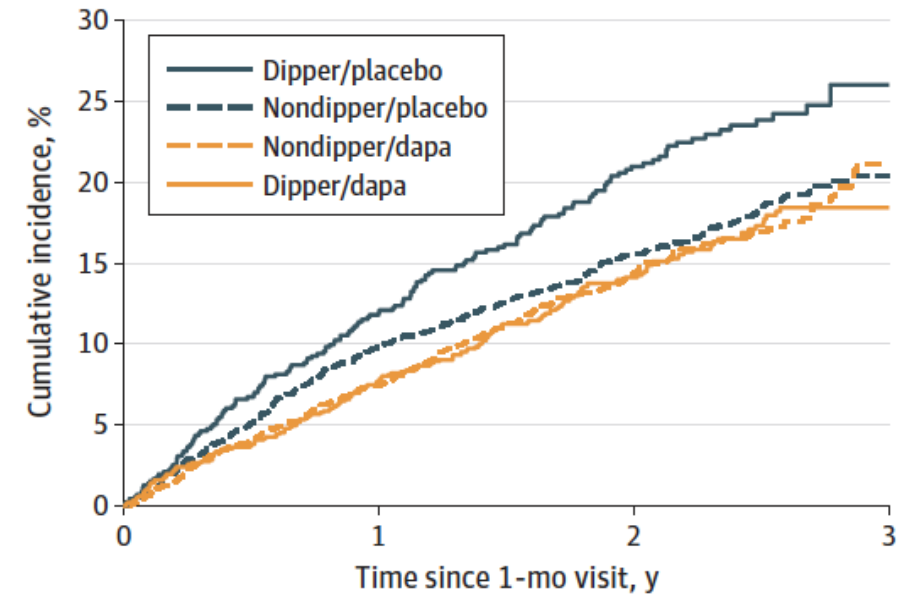
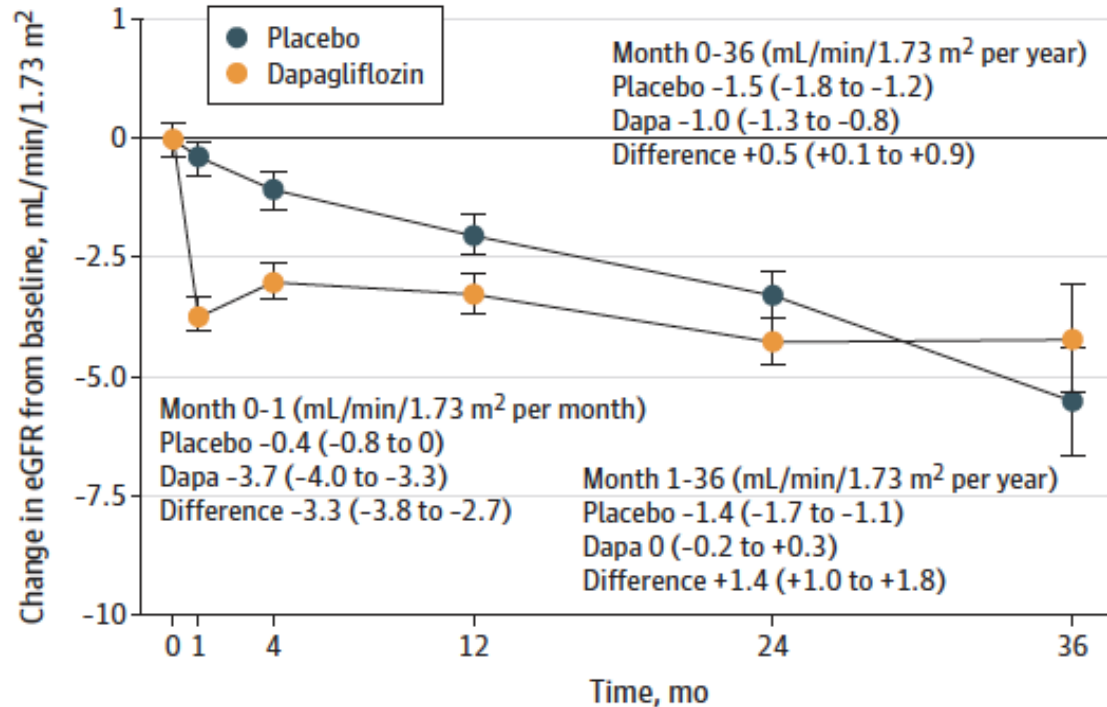


## SGLT2i



Velazquez E, et al. N Engl J Med 2019;380:539-548  
Morrow DA...Desai AS, et al. Circulation 2019;139:2285–2288

# Trajectory of eGFR change after dapagliflozin



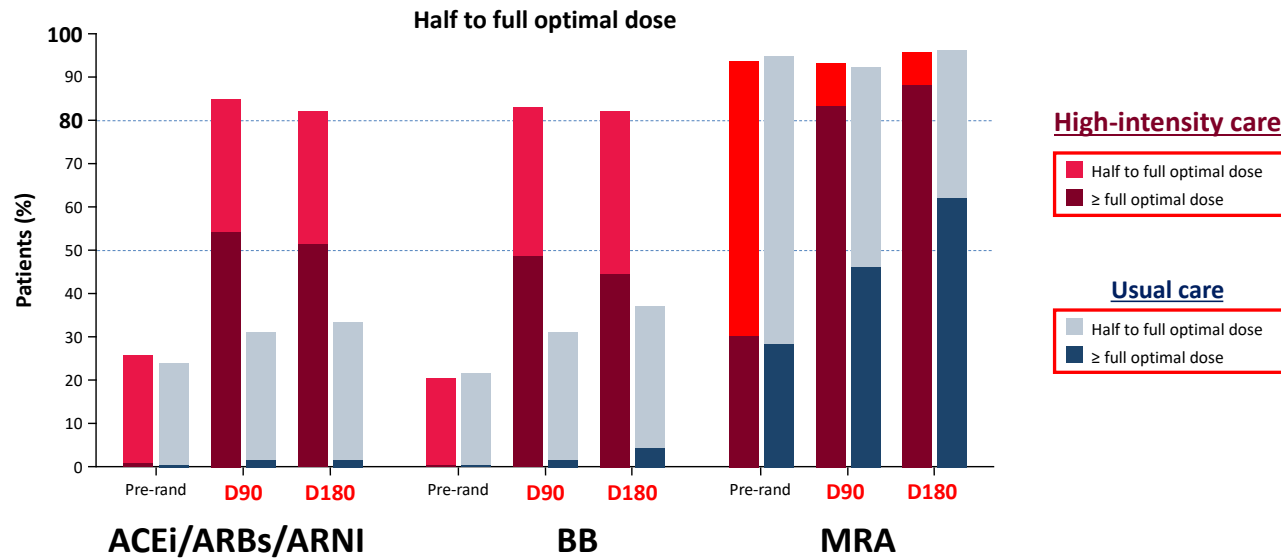
| No. at risk       |      |      |      |     |
|-------------------|------|------|------|-----|
| Dipper/placebo    | 720  | 616  | 397  | 42  |
| Nondipper/placebo | 2140 | 1884 | 1261 | 156 |
| Nondipper/dapa    | 1739 | 1563 | 1006 | 107 |
| Dipper/dapa       | 1135 | 1020 | 695  | 93  |

**Expect ~10% 'dip' in eGFR in first month after initiation of dapagliflozin**

McCausland F, et al. JAMA Cardiol Jan 2023  
 McCausland F, et al. JAMA Cardiol Nov 2023

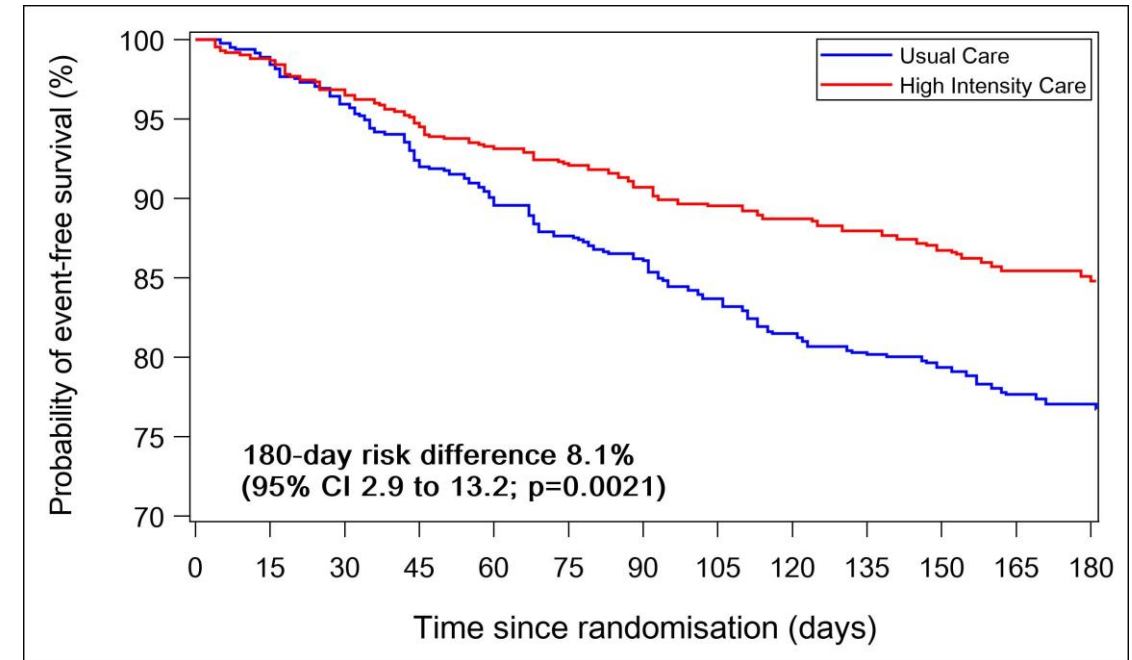
# Impact of Rapid Optimization of HF Therapies in Hospitalized HFrEF Patients

## Utilization of GDMT



Greater use of GDMT at 90 and 180 days in high intensity care arm

## 180-Day HF Readmission or All-Cause Death



Lower rates of readmission and death at 180 days

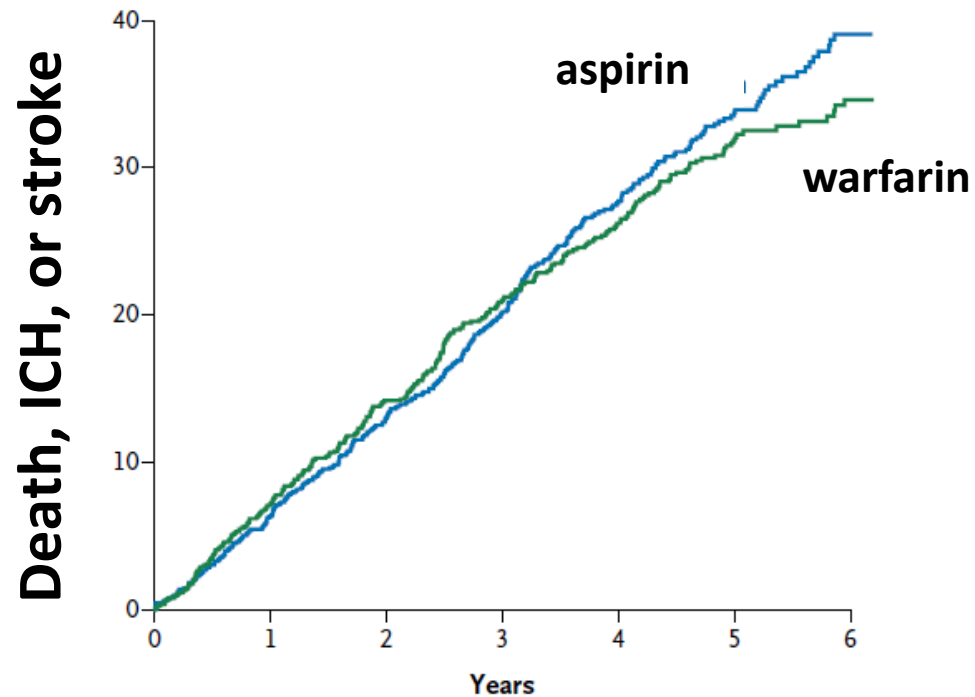
***Implication: Initiate 4-drug HF therapy before hospital discharge***

# HF Management: Beyond Drugs

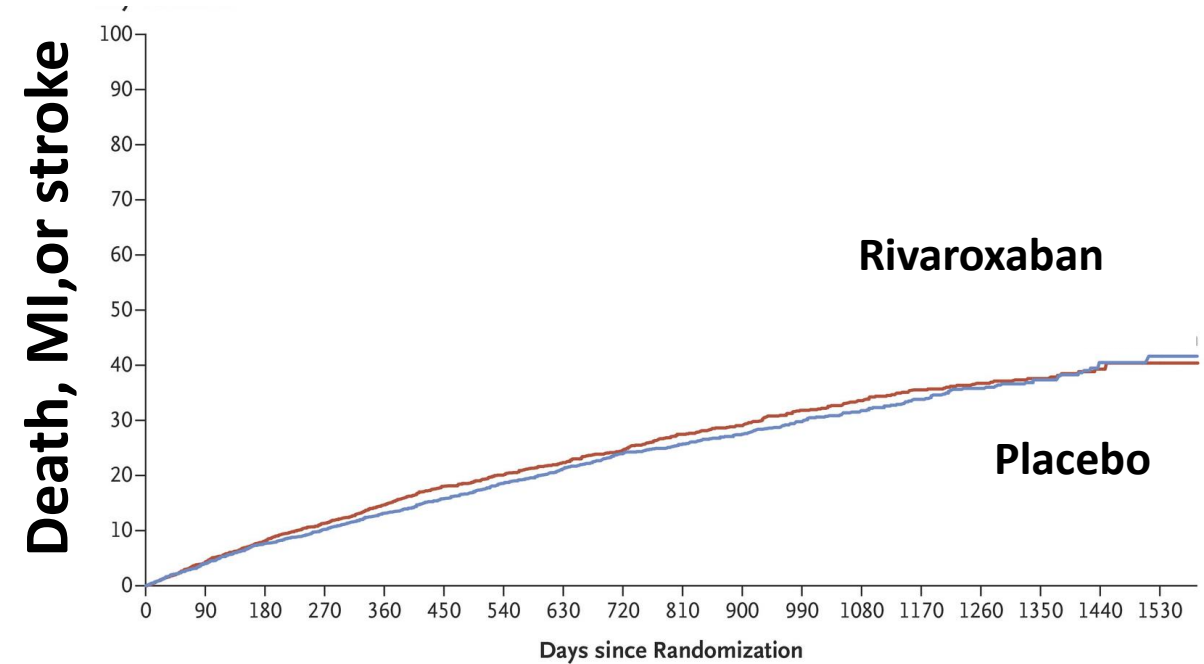
- **Lifestyle Modification**
  - Dietary sodium restriction, moderation/abstinence from ETOH, exercise, weight reduction
- **Comorbidity Management**
  - Diabetes, Hypertension, CKD, Sleep Apnea, COPD
  - Vaccination (influenza, COVID-19)
- **Prevention of Thromboembolism**
  - Anticoagulation for AF or other high-risk features
- **Rhythm Management**
  - Management of Atrial Fibrillation/Ventricular Tachycardia
  - Sudden Death Prevention with ICD ( $EF \leq 35\%$ )
  - Cardiac Resynchronization/Biventricular Pacing ( $EF \leq 35\%$  with LBBB and  $QRSd > 150ms$ )
- **Longitudinal Surveillance**
  - Nurse-led Disease Management
  - Hemodynamic monitoring

# Anticoagulation for HFrEF (in SR)

**WARCEF**  
(Coumadin vs. Aspirin)



**COMMANDER-HF**  
(rivaroxaban 2.5 bid vs. Placebo)

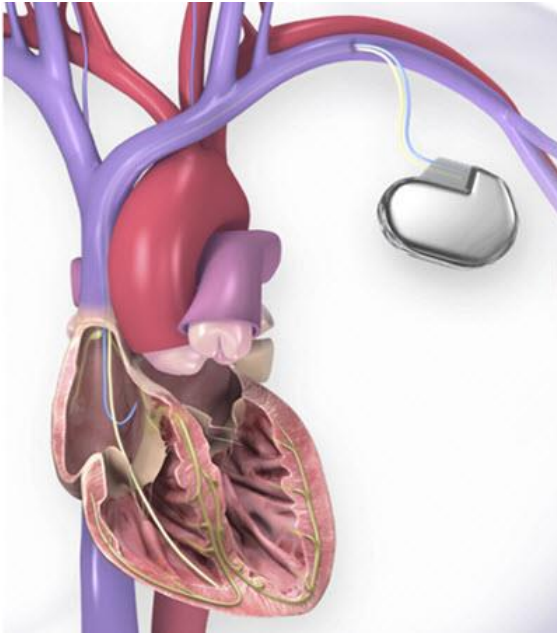


**...but should anticoagulate those at high risk  
(AF, prior TIA/stroke, LV thrombus)**

Homma S, et al. N Engl J Med 2012  
Zannaf F, et al. N Engl J Med 2018

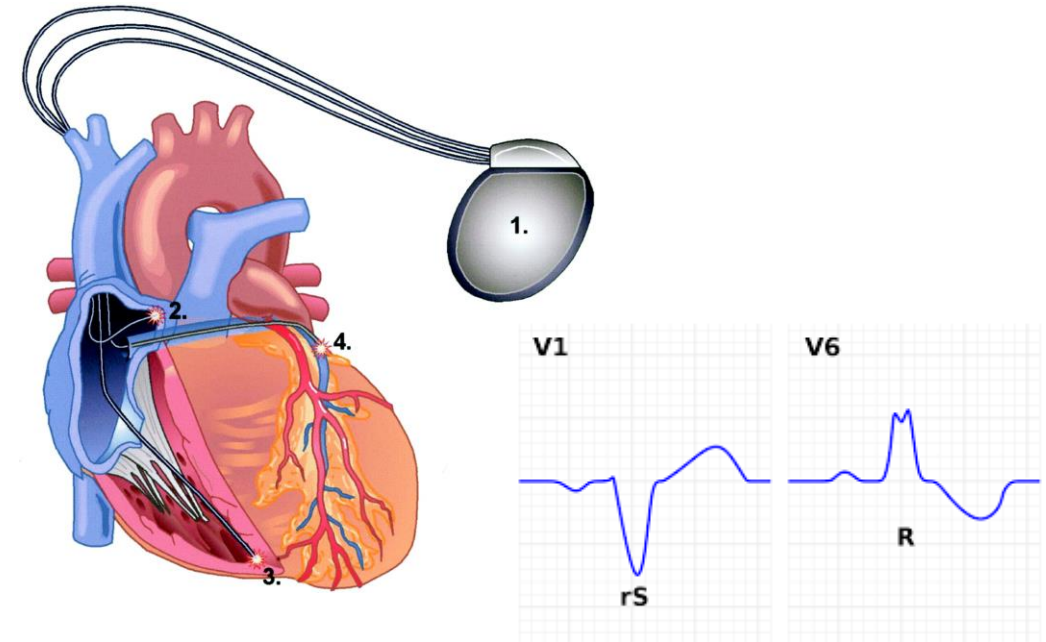
# Implantable Electronic Devices for HF

## ICD



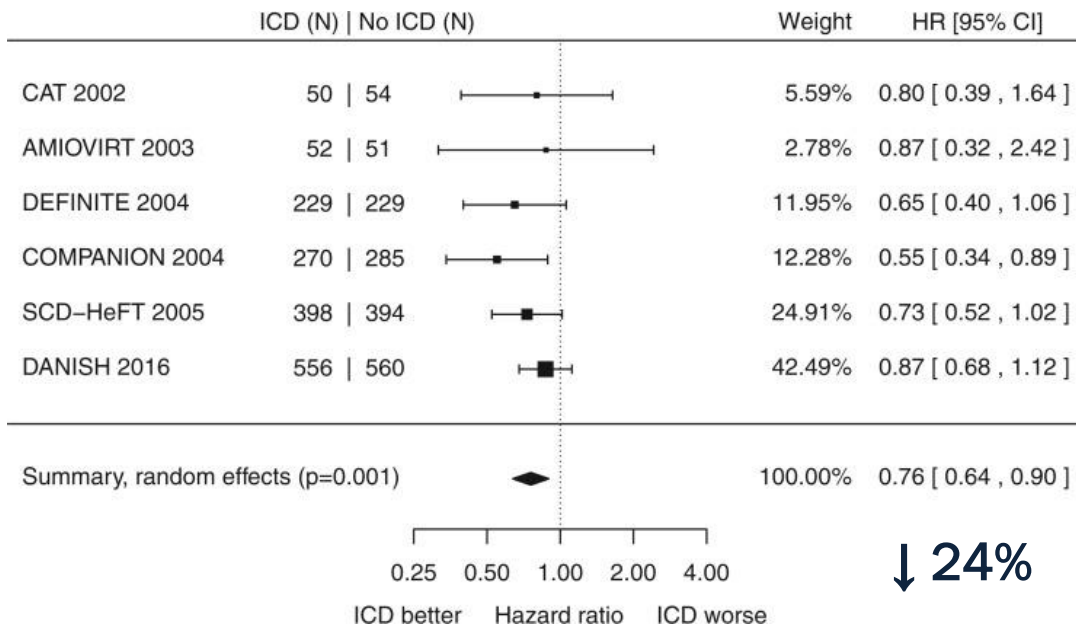
- Prior Sustained VT/Cardiac Arrest
- Unexplained Syncope
- Symptomatic HF with  $EF \leq 35\%$

## CRT(D) 'Bi-Ventricular Pacing'

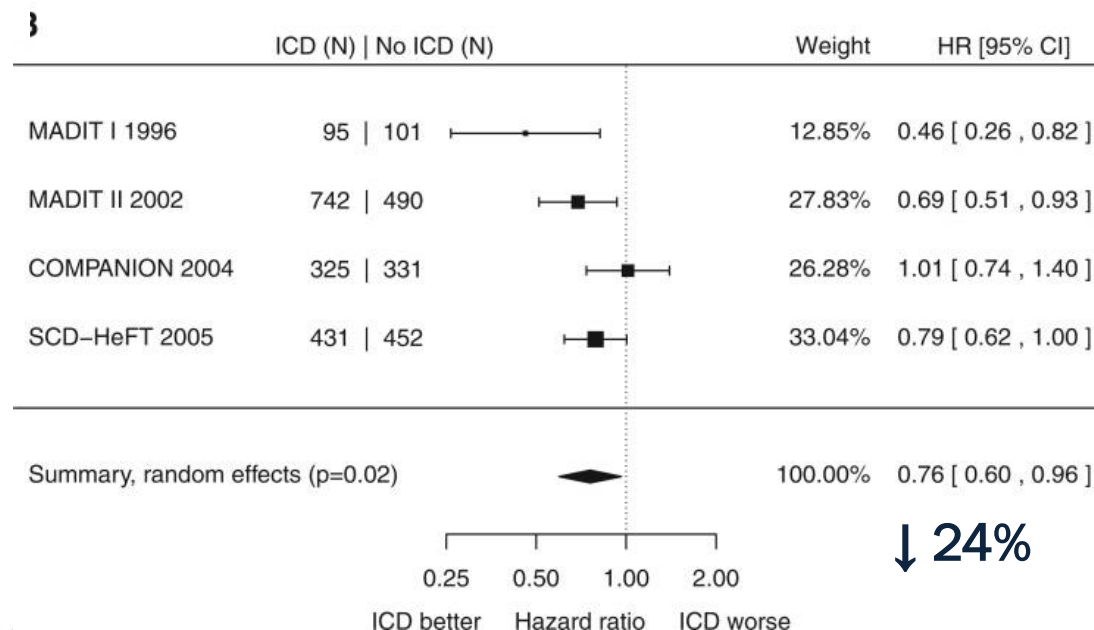


- Symptomatic HF despite optimal Medical Rx
- $EF \leq 35\%$ , LBBB, QRS  $> 150$  ms

## Nonischemic CMP



## Ischemic CMP



# ICDs Reduce Mortality in HFrEF

## Indications

- Secondary Prevention
  - Prior Cardiac Arrest/Sustained VT
  - Unexplained Syncope
- Primary Prevention
  - $EF \leq 40\%$ , CAD, NSVT, inducible VT
  - $EF \leq 30\%$ , CAD >40d post-MI or 90d post revasc, NYHA I-III
  - $EF \leq 35\%$ , no CAD, NYHA II-III

# Transvenous ICDs

## PROS

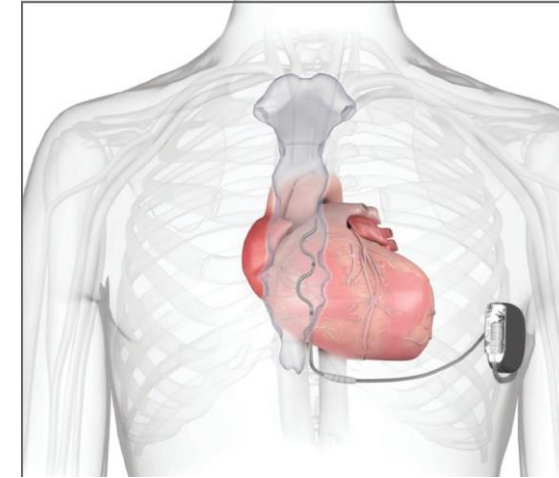
- Pacing for Bradycardia
- ATP to reduce shocks
- Enhanced atrial/ventricular diagnostics

## CONS

- Infection
- Lead Fracture
- Tricuspid Regurgitation
- Venous Obstruction

# Extravascular ICD Alternatives

- ✓ Low risk of systemic infection
- ✓ Preserves venous access
- ✓ Avoids risks of lead extraction
- ✓ Comparable Efficacy



## S-ICD

(lead **over** ribs/sternum)

- ✓ No pacing, no ATP
- ✓ No advanced diagnostics
- ✓ Large pulse generator

## EV-ICD

(lead **under** sternum)

- ✓ Post shock pacing
- ✓ Asystole pacing
- ✓ Antitachycardia pacing

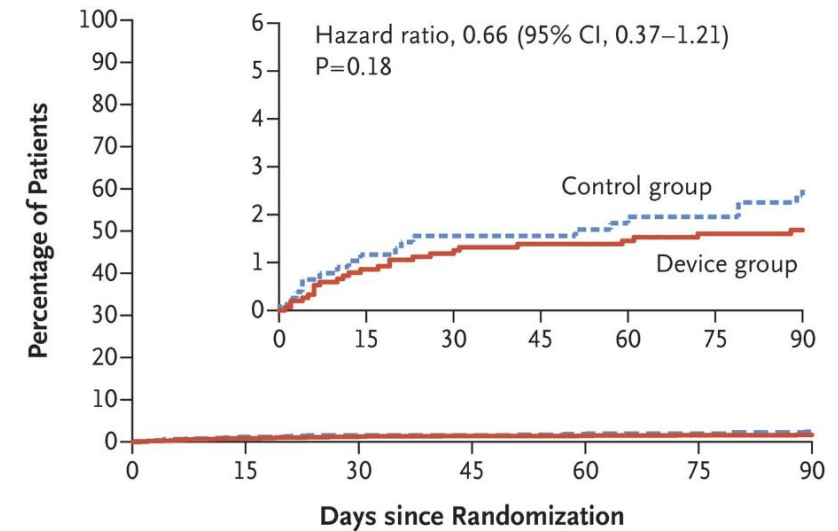
# Wearable ICD

- ✓ For use during temporary periods of elevated risk for SCD during which patients may not be eligible for ICD (e.g. post-MI)
- ✓ Newer generation devices are water resistant and more comfortable

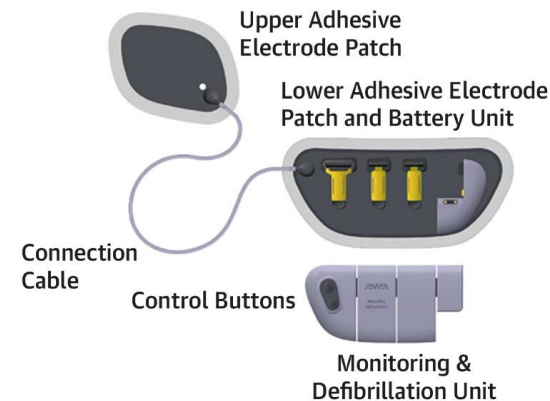
Life Vest



VEST Trial

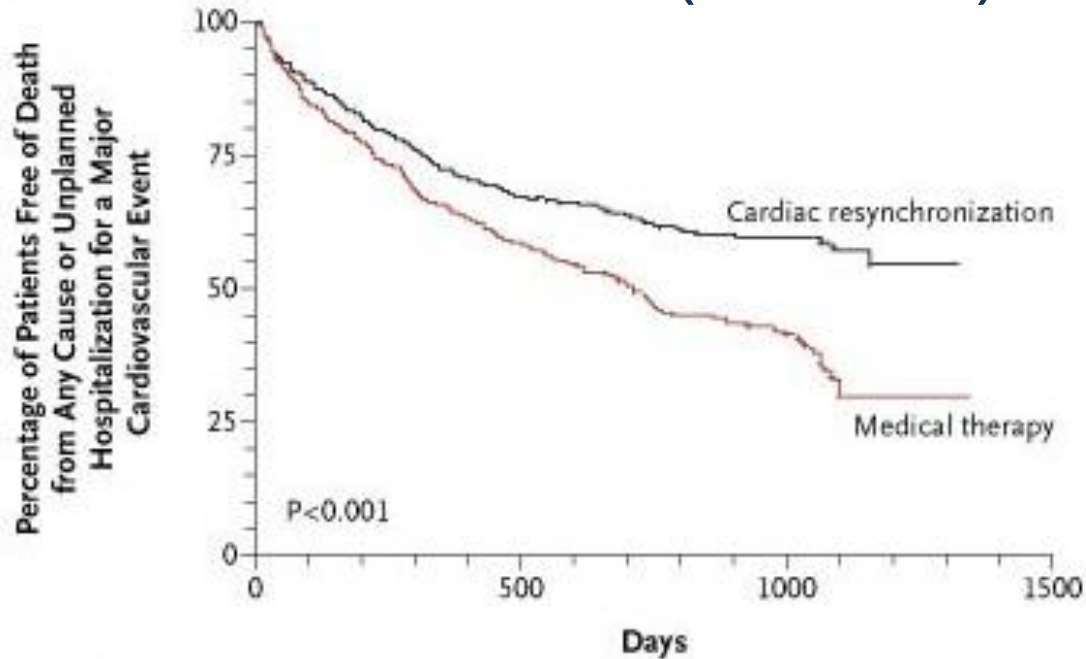


P-WCD

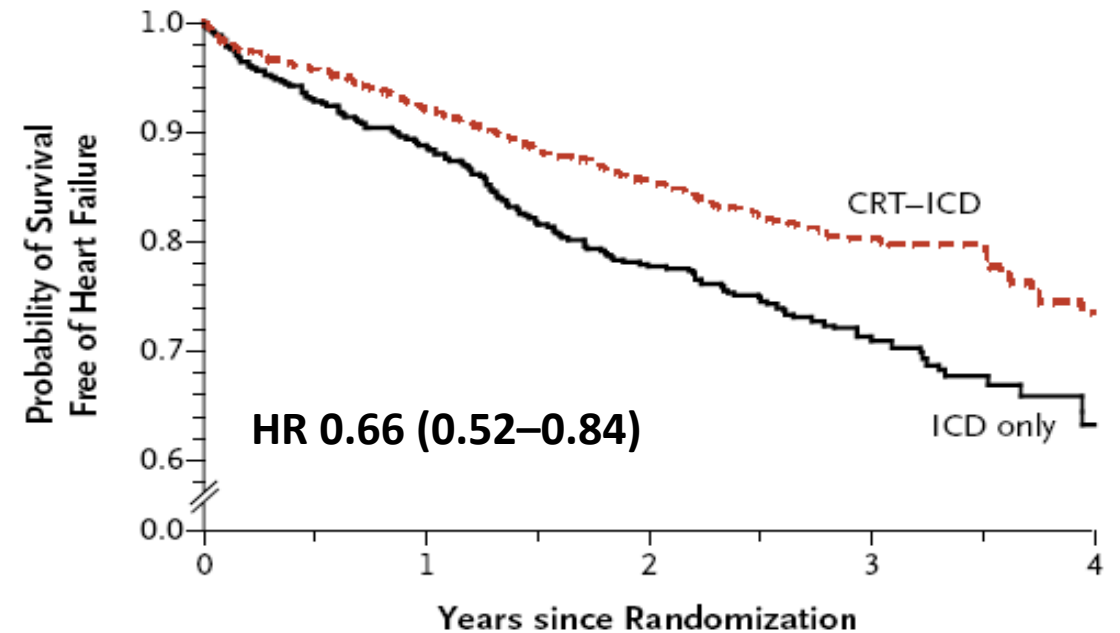


# Cardiac Resynchronization Therapy for HF

CARE-HF (NYHA III-IV)



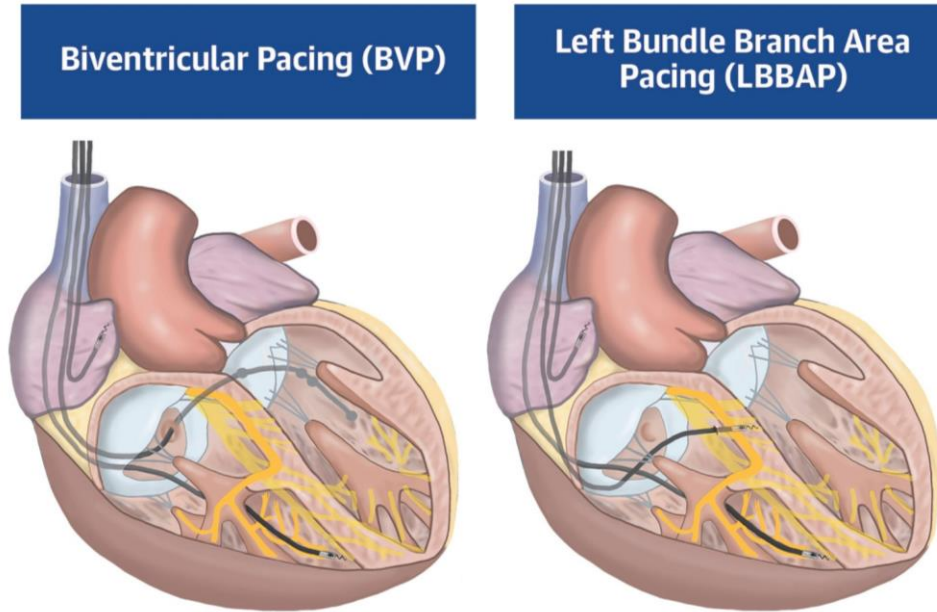
MADIT-CRT (NYHA I-II)



- ✓ Improvement in LVEF, reduction in LVDD, and reduction in functional MR
- ✓ Improvement in HF hospitalizations + Survival
- ✓ Greatest benefit in  $EF \leq 35\%$ , LBBB,  $QRSd > 150$  ms

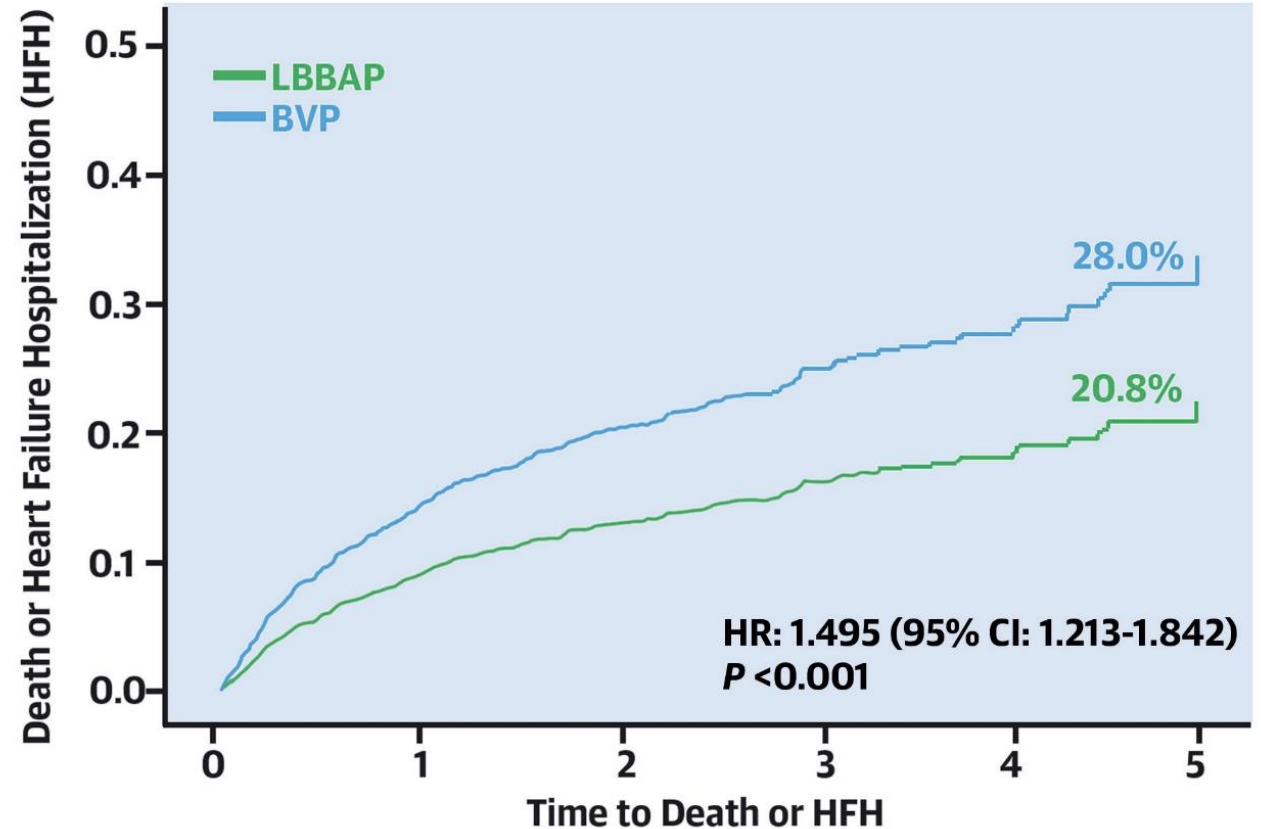
1/3 are non-responders

# Conduction System Pacing for HF

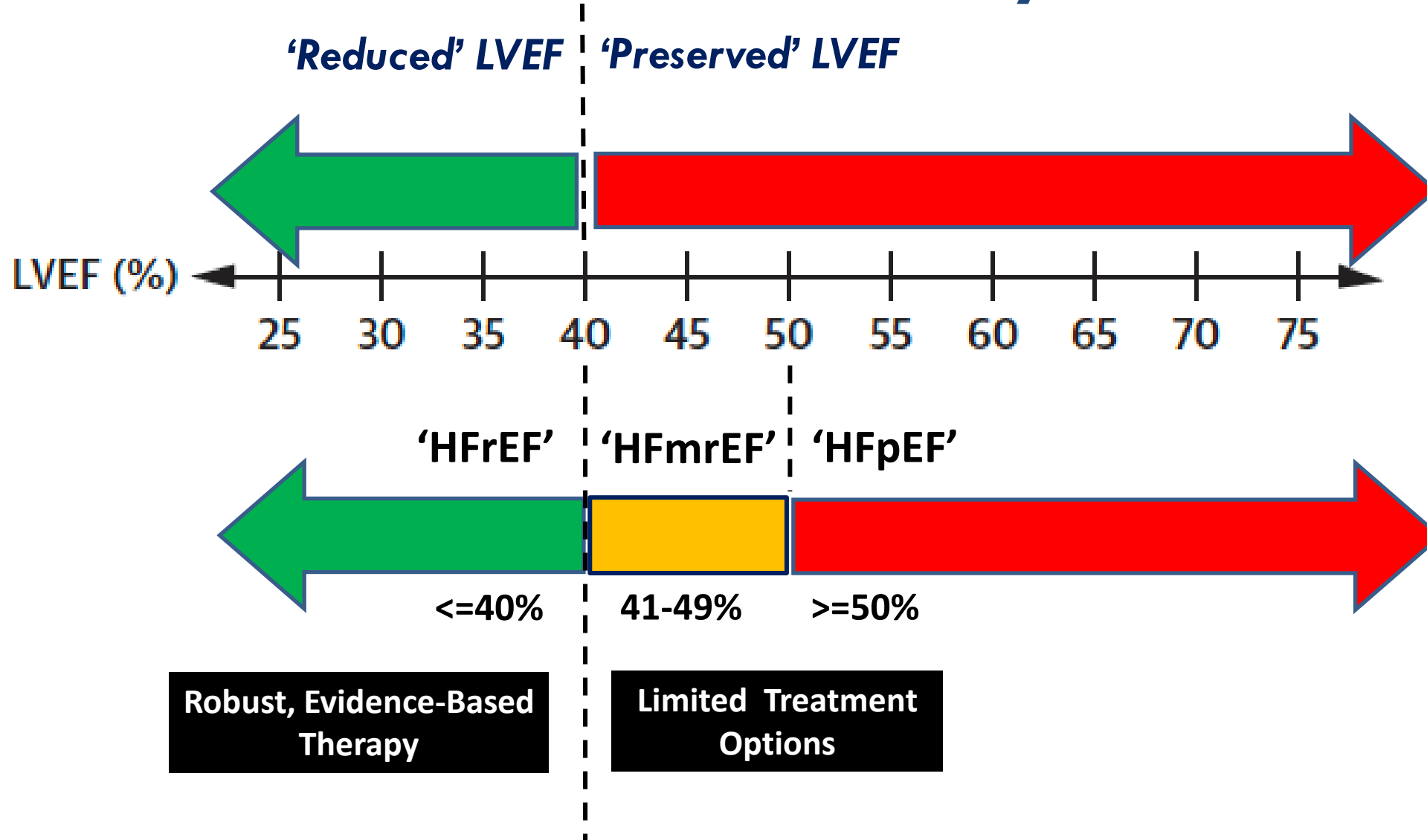


- ✓ High Procedural Success
- ✓ Shorter paced QRS
- ✓ Avoids additional lead
- ✓ ? Lower rates of HF Hospitalization than CRT

I-CLAS (N=1778, observational)



# Classification of HF by LVEF



# HFpEF: A Heterogeneous Syndrome

- Amyloidosis 13% of HFpEF\*
- Hemochromatosis
- Endomyocardial Fibrosis
- Radiation-Induced
- Chemotherapy-induced

**Restrictive  
CMP**

**Pericardial  
Disease**

- Constrictive Pericarditis
- Constrictive-Effusive Disease
- Post-Pericardiotomy Syndrome

**HF Signs and Symptoms  
Normal LVEF**

**RV Failure**

- PAH
- ARVC
- Sarcoidosis
- TR

**Hypertrophic  
CMP**

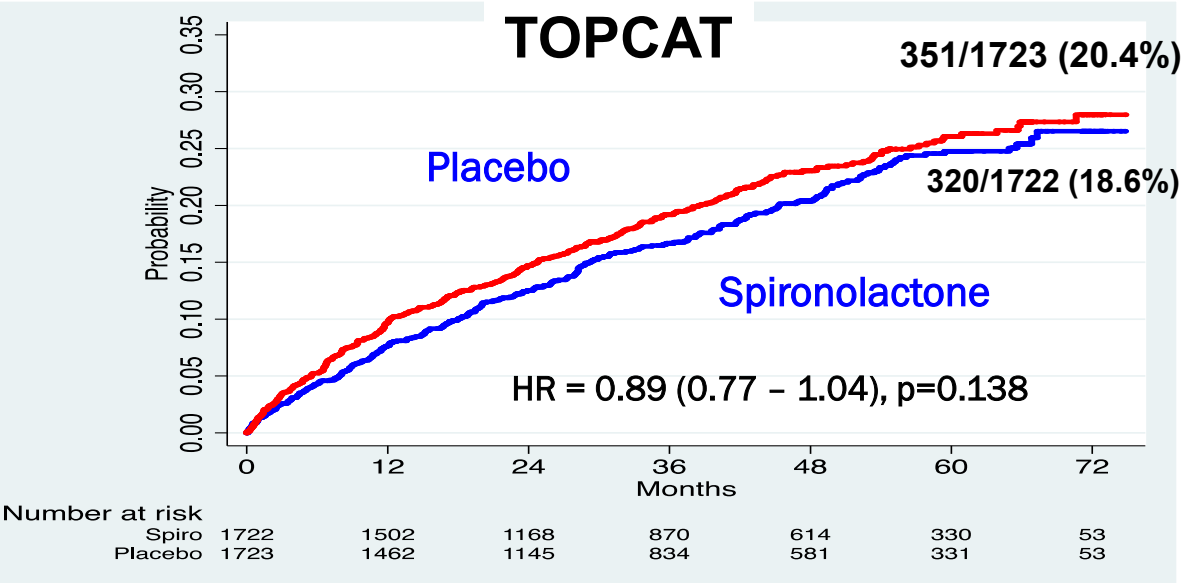
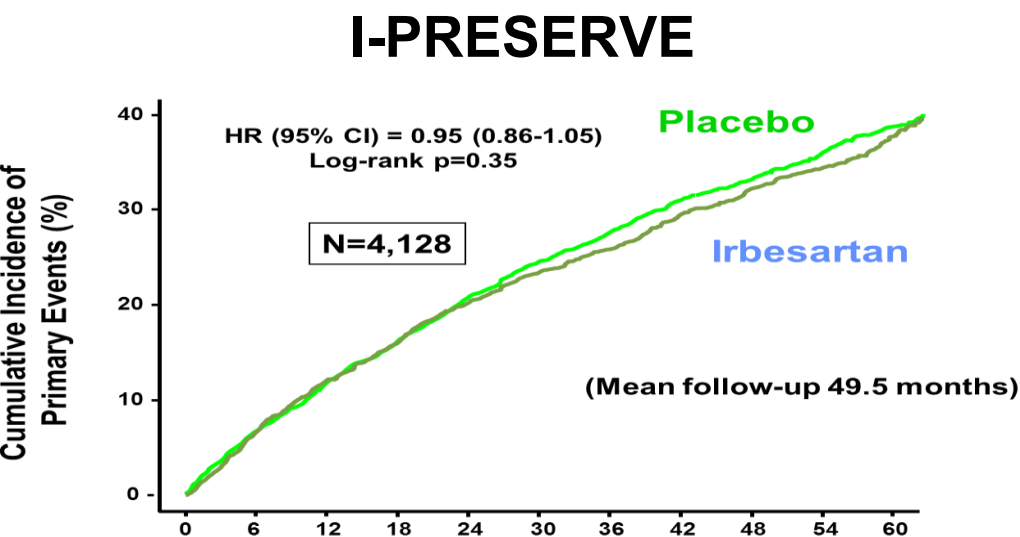
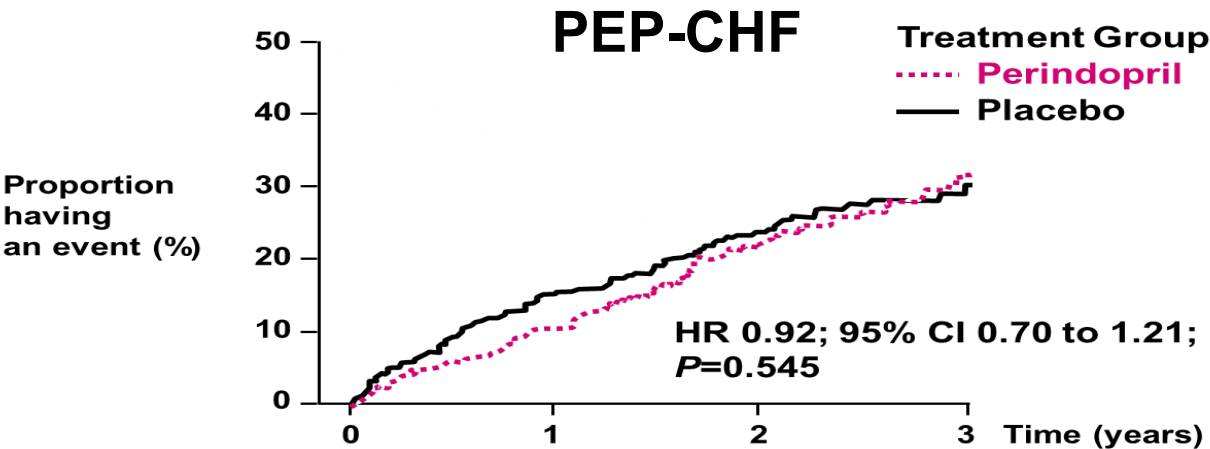
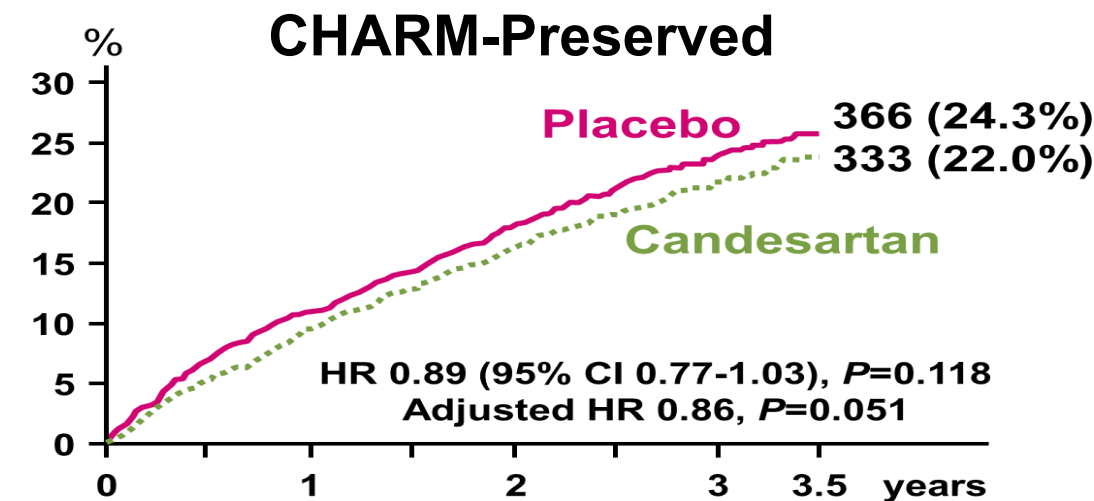
- Fabry
- LAMP2
- PRKAG2

**Storage Disease**

**HF-PEF**

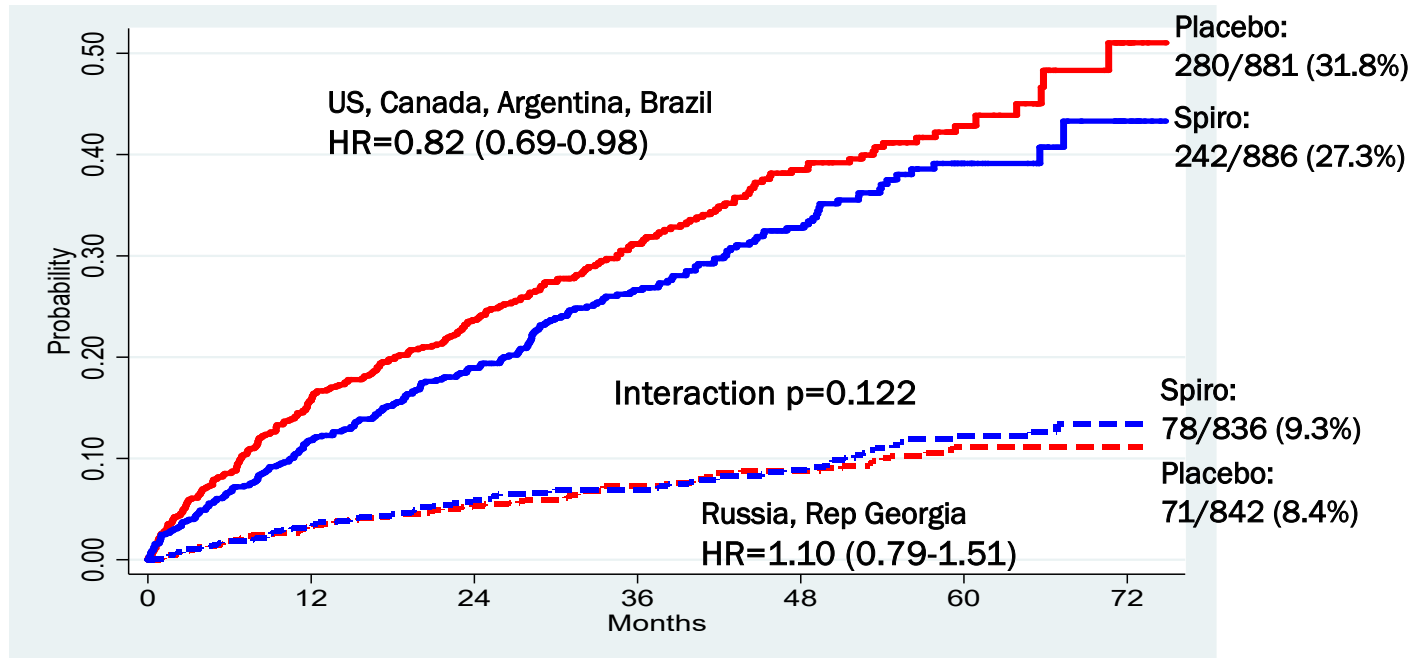
\*Gonzalez-Lopez, E. Eur Heart J. 2015; 36:2585

# RAAS Antagonists in HFpEF

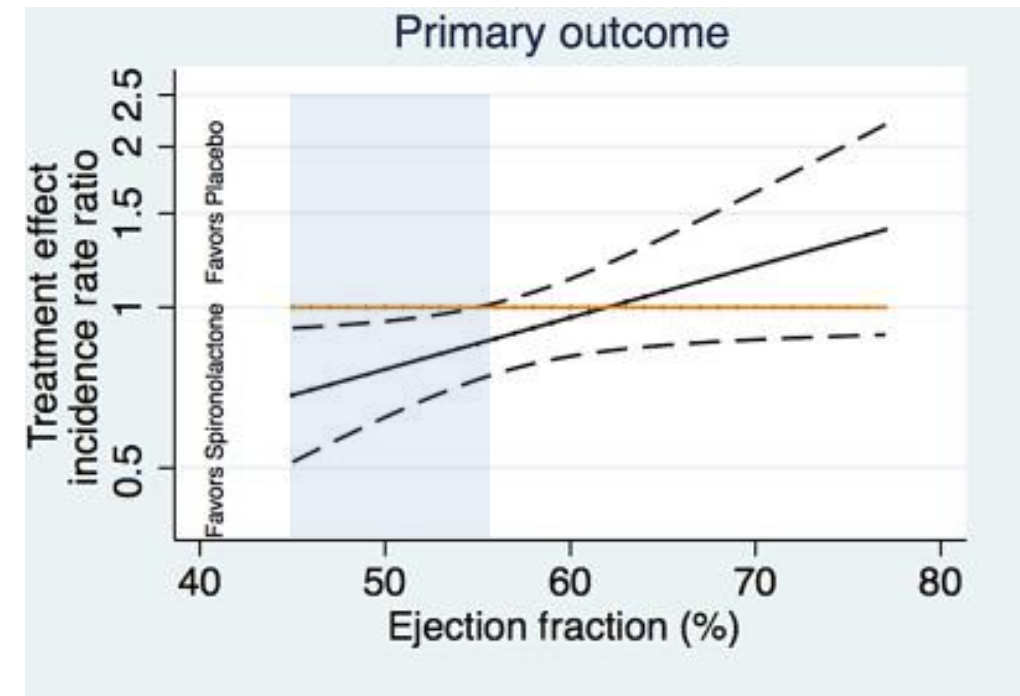


# Steroidal MRA for HF and $EF \geq 45\%$

## Primary Endpoint by Region



## Treatment Effect by EF



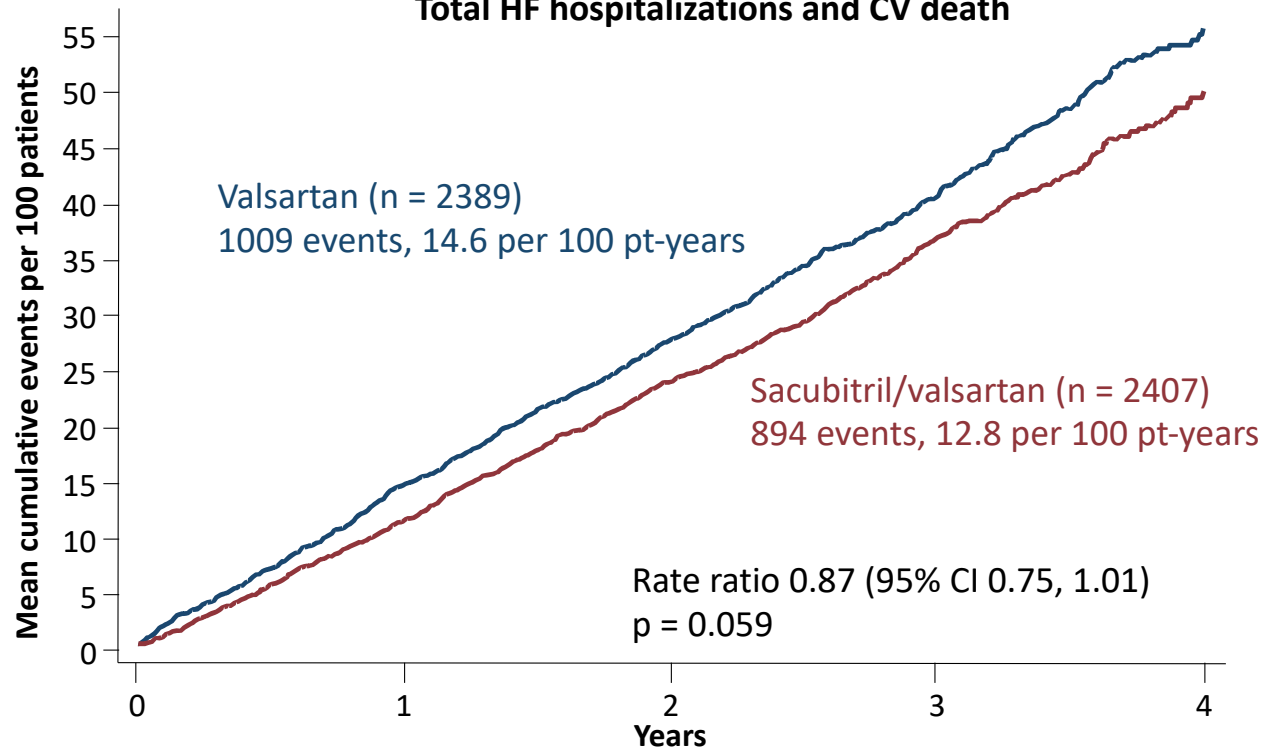
**Treatment effect apparent predominantly in  $EF < 55\%$**

# ARNI in HFmrEF/HFpEF

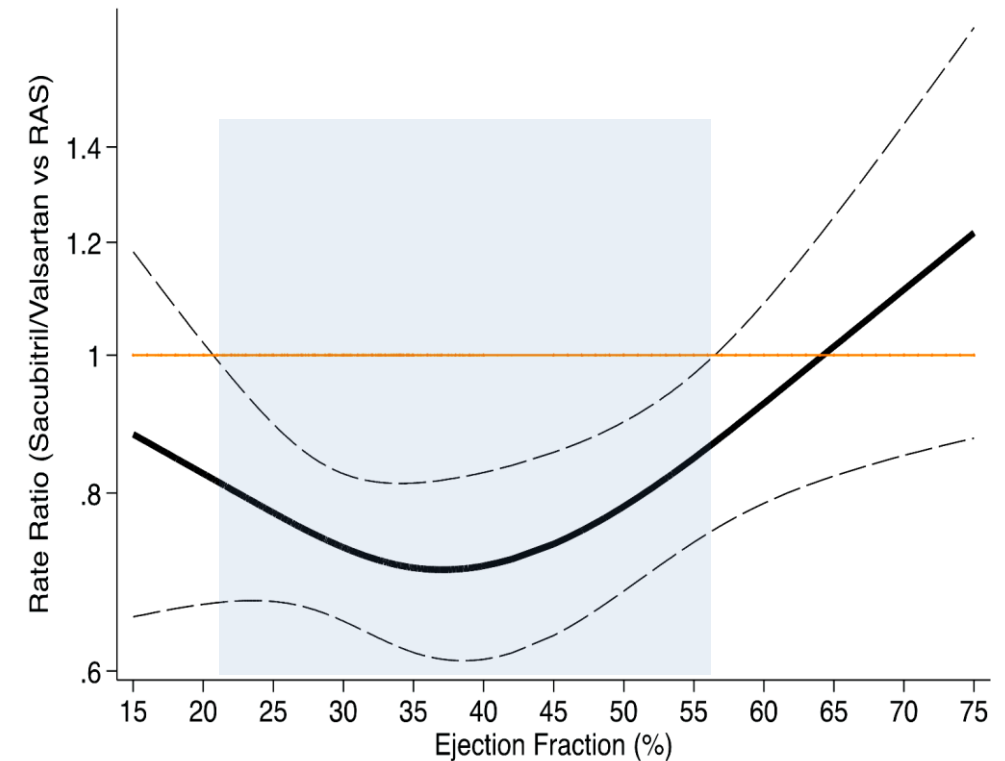


## PARAGON-HF Primary Results

Total HF hospitalizations and CV death



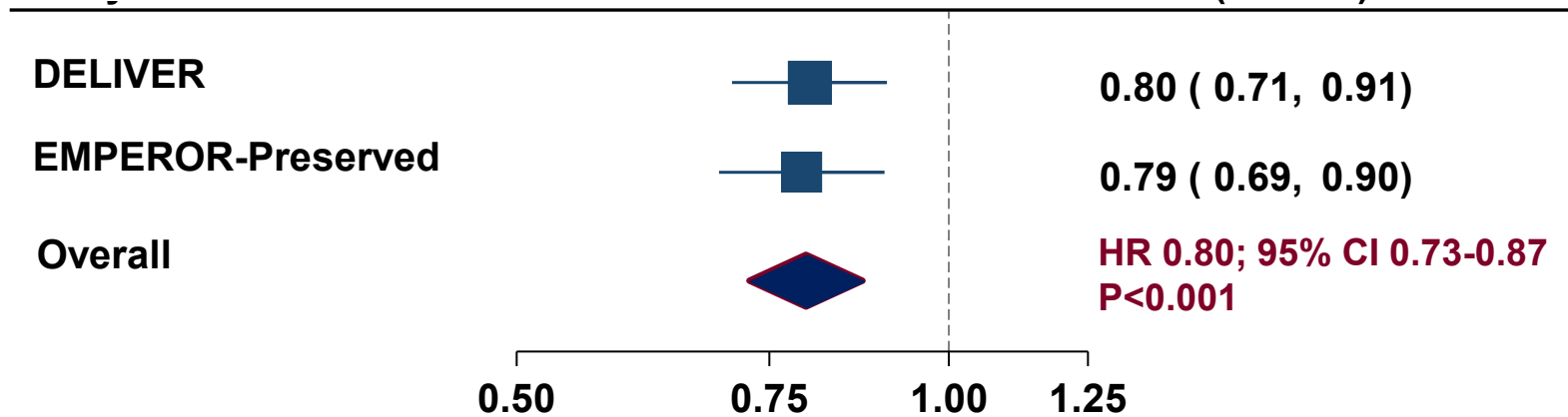
## PARADIGM-HF/PARAGON-HF Pooled



**Treatment effect apparent predominantly in EF<57%**

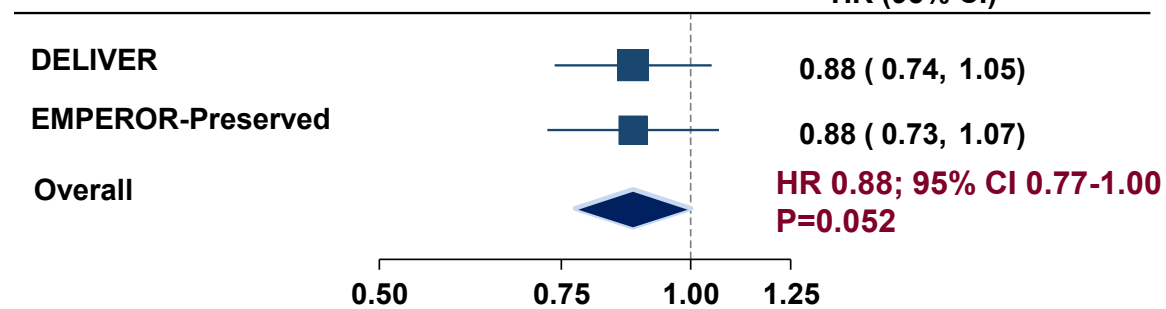
# SGLT2i for HF with LVEF>40%

## Cardiovascular Death or First Hospitalization for HF

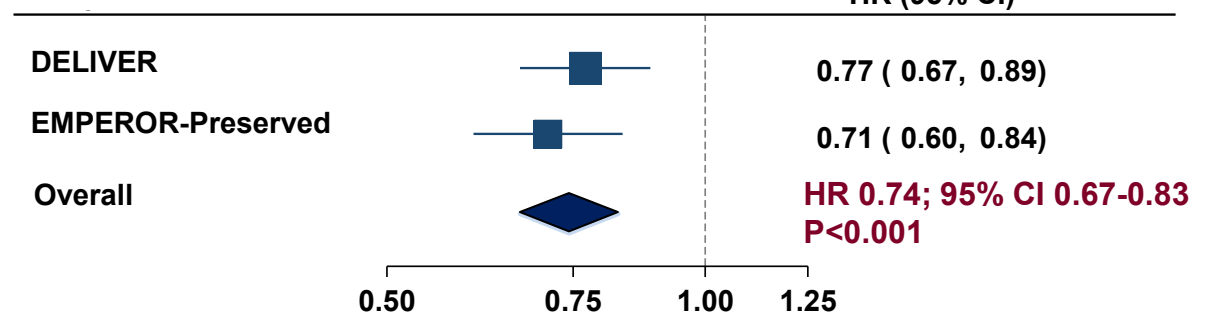


↓ **20% risk reduction**

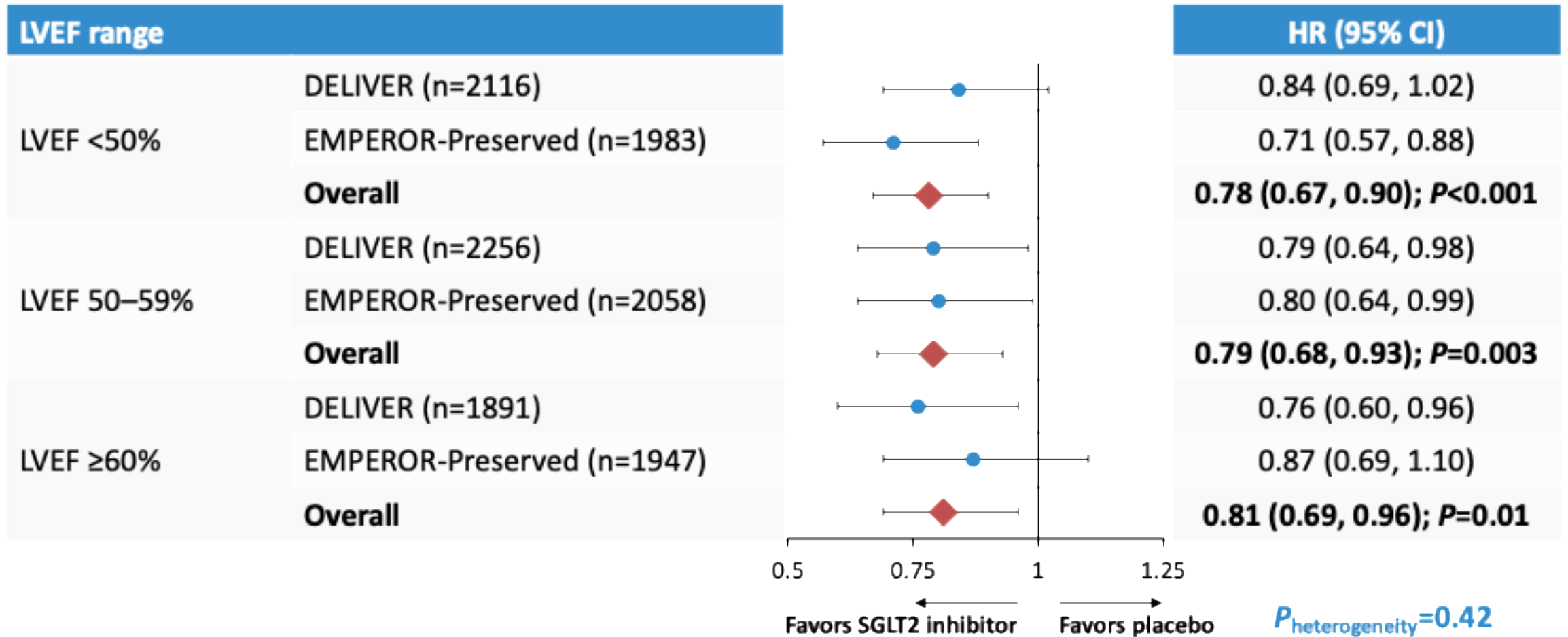
## Cardiovascular Death (excluding Unknown Death)



## Hospitalization for HF

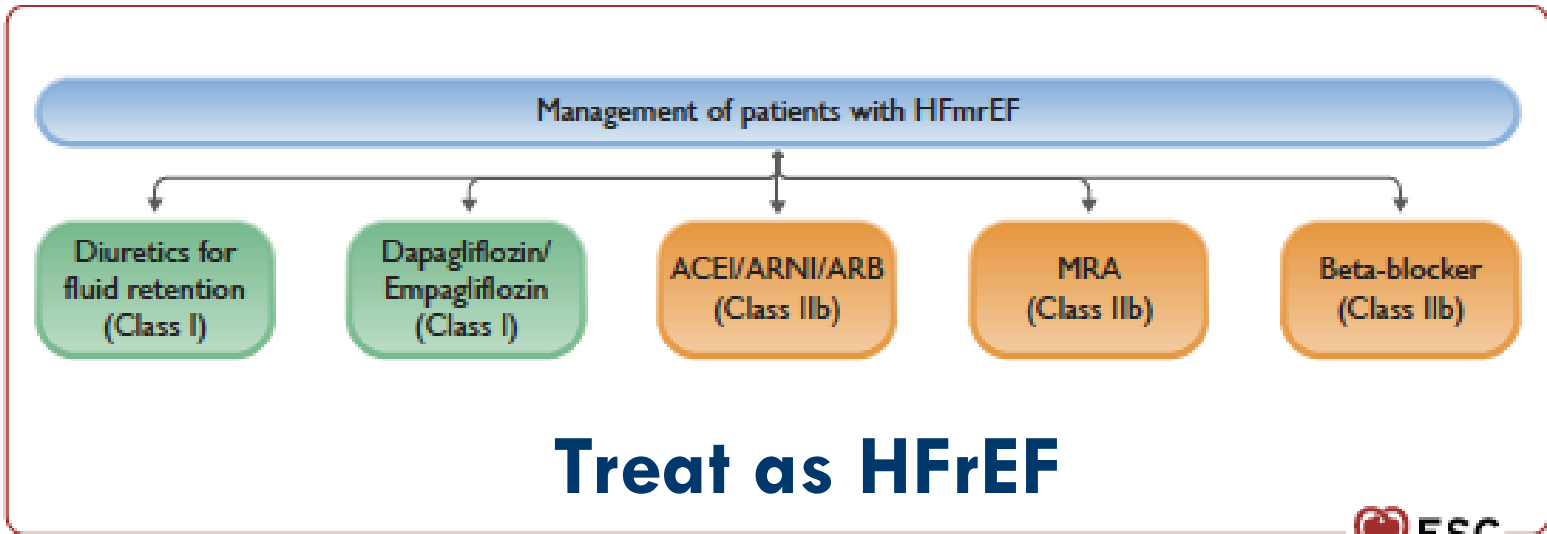


# Effect of SGLT2i in HFpEF by EF



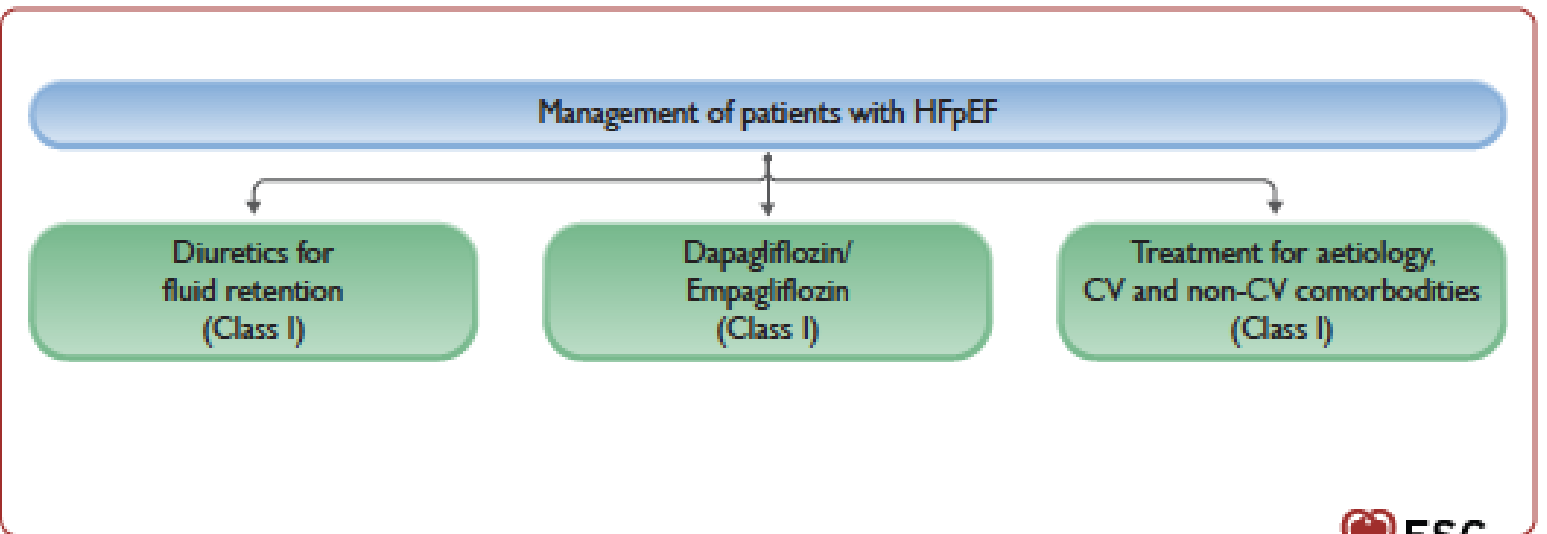
# Updated Guidelines for HFmrEF/HFpEF

**HFmrEF**  
(EF 41-49%)

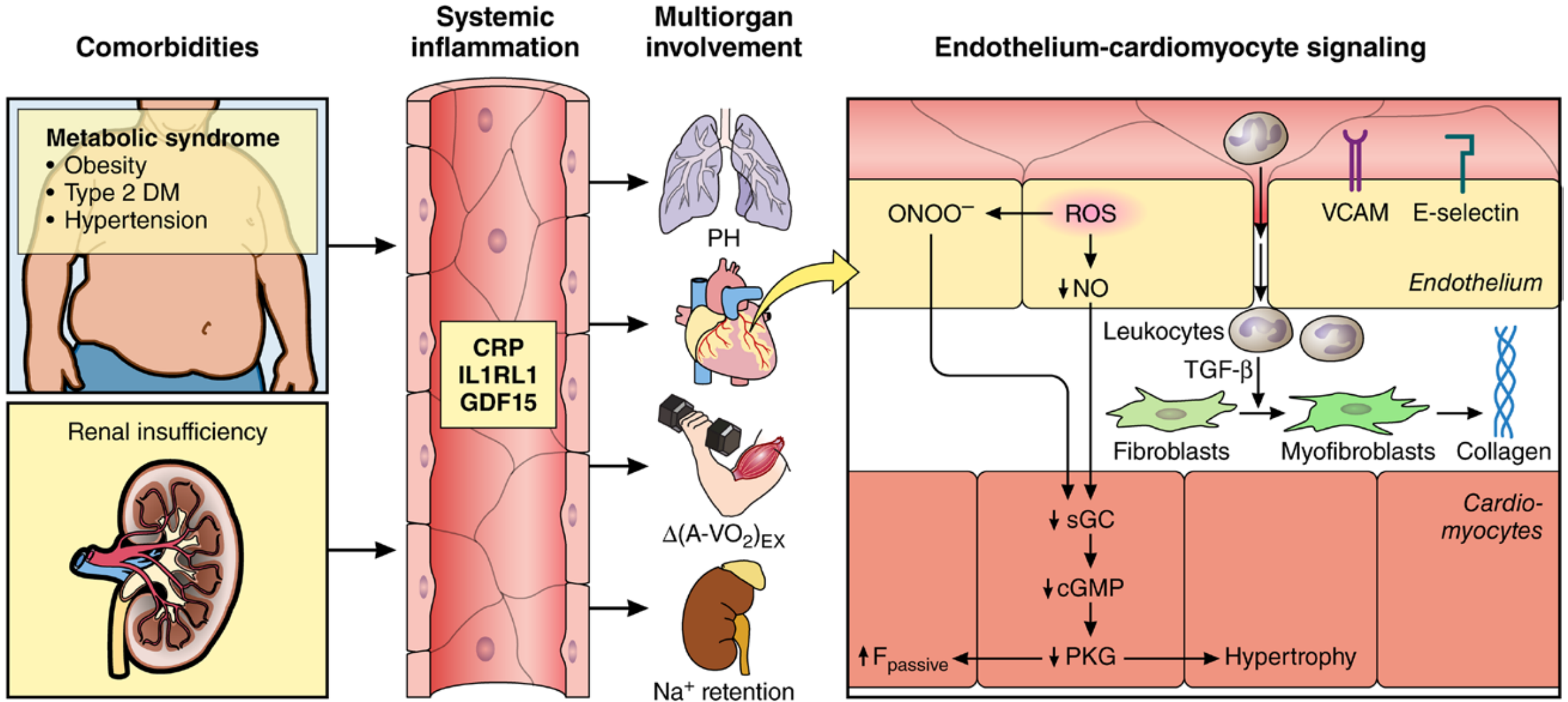


**2023 Focused Update of the 2021 ESC  
Guidelines for the diagnosis and treatment  
of acute and chronic heart failure**

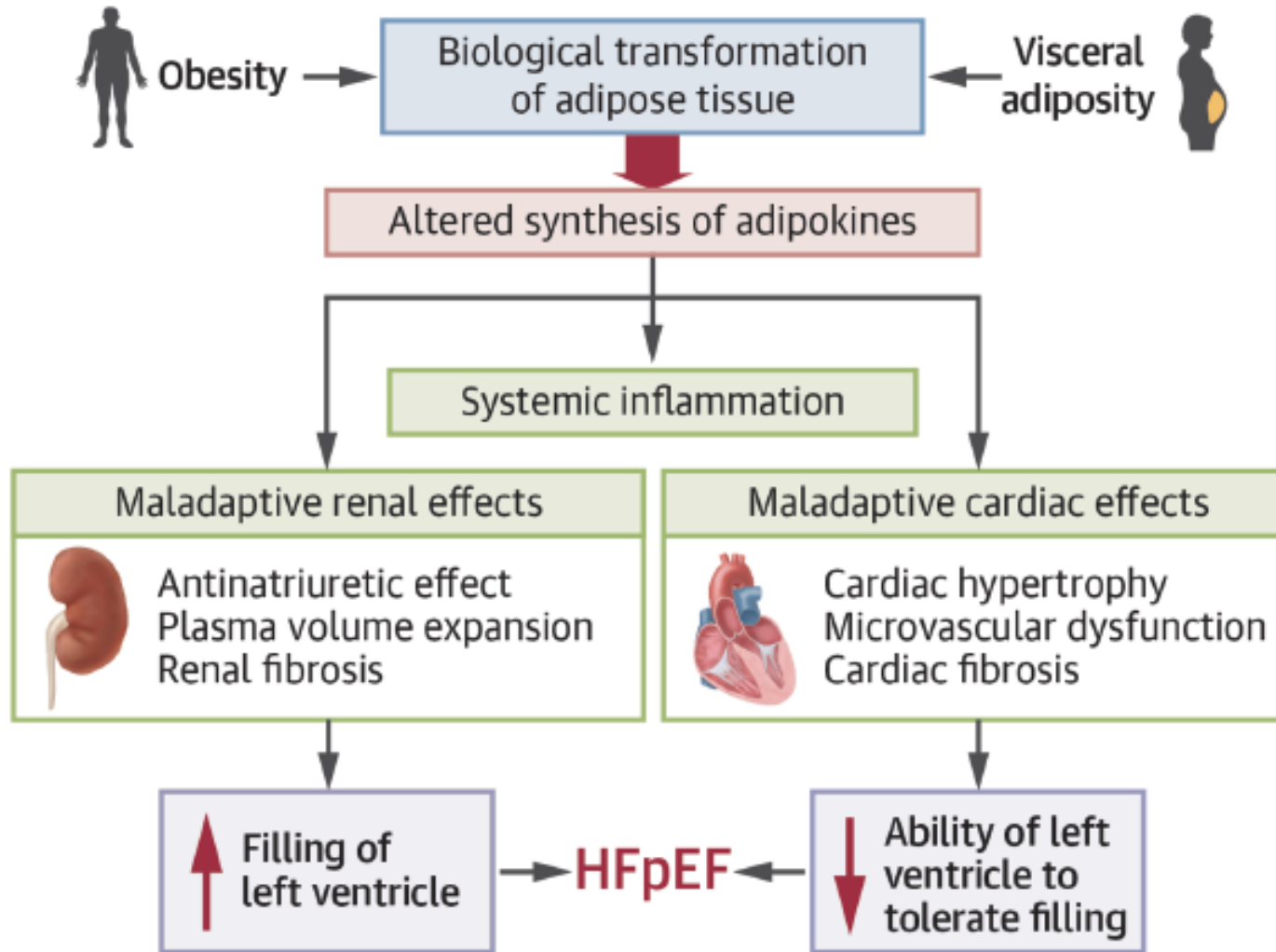
**HFpEF**  
EF ≥ 50%



# HFpEF is a Systemic, CKM Spectrum Disease

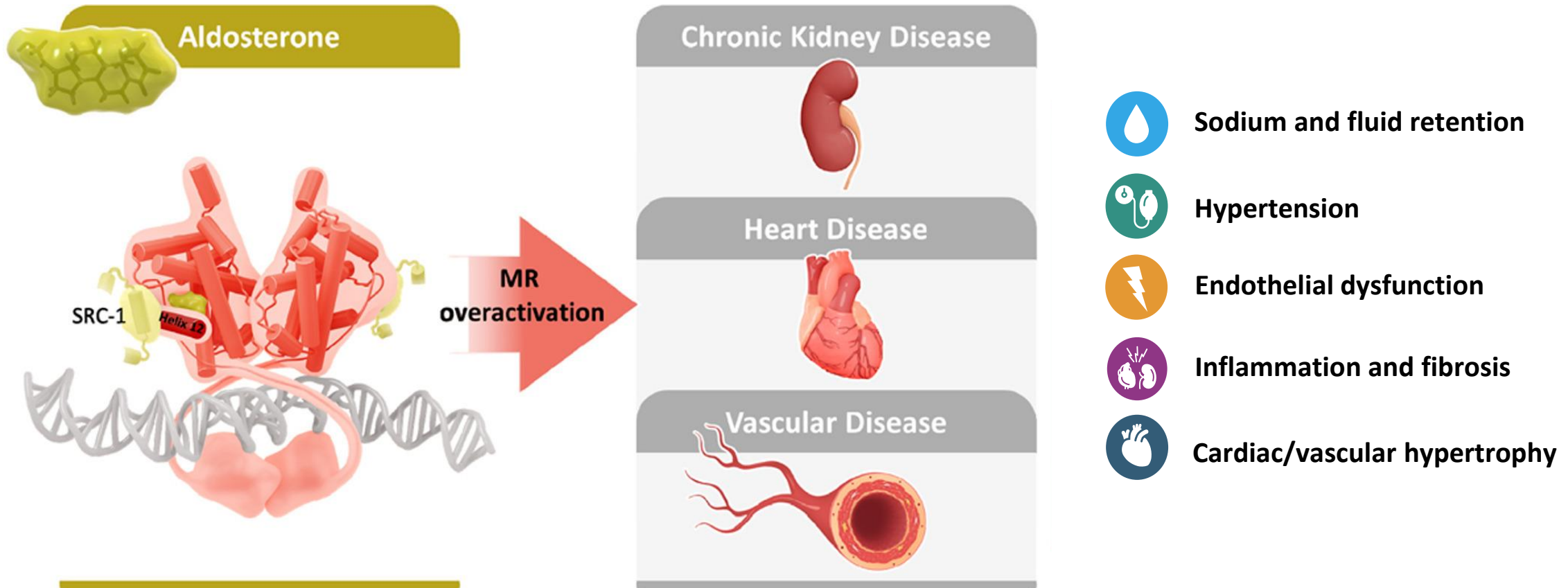


# HFpEF: A Disease of 'Angry' Adipocytes

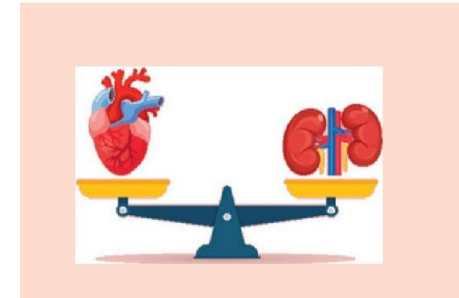
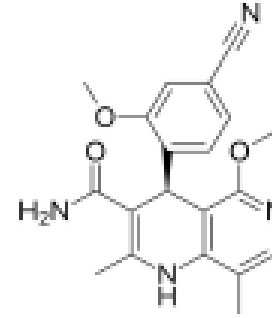
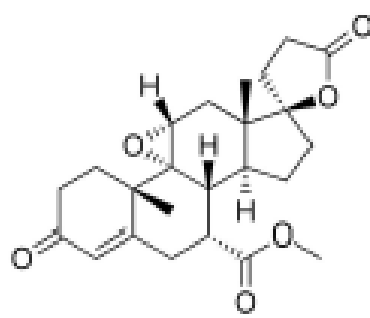
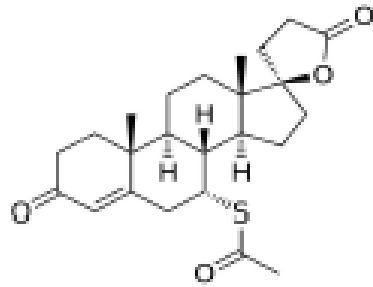
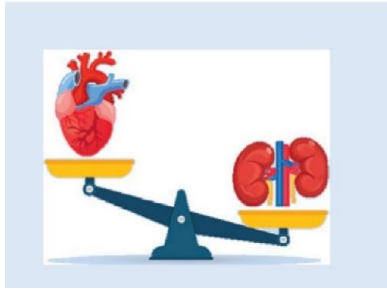


*Excess adiposity present in > 90% of patients with HFpEF enrolled in clinical trials*

# Cardiorenal Effects of MR Overactivation



# Steroidal vs. Nonsteroidal MRAs



|                     | Spironolactone   | Eplerenone       | Finerenone            |
|---------------------|------------------|------------------|-----------------------|
| Structure           | Flat (steroidal) | Flat (steroidal) | Bulky (non-steroidal) |
| Potency to MR       | +++              | +                | +++                   |
| Selectivity to MR   | +                | ++               | +++                   |
| Tissue distribution | Kidney > heart   | Kidney > heart   | Balanced kidney-heart |
| Active metabolites  | +++              | -                | -                     |
| Half-life           | Long*            | 4-6 hours        | 2-3 hours             |
| Sexual side-effects | ++               | +                | -                     |

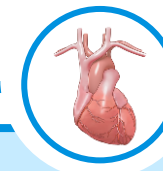
Highly Potent

Highly Selective

No Active Metabolites

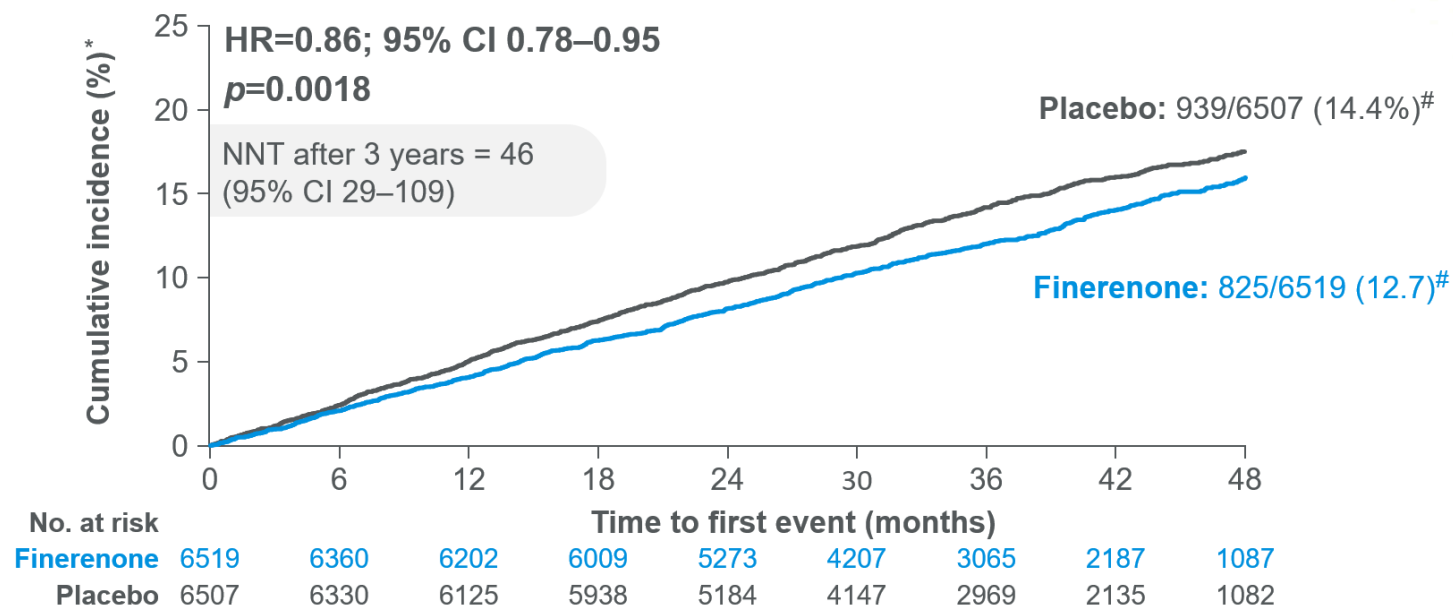
Short Half-Life

# Finerenone in Diabetic CKD



- Pooled data from **FIDELIO-DKD** and **FIGARO-DKD**
- **>13,000** patients with **CKD, type 2 DM, and** moderate-to-severe **albuminuria** (UACR  $\geq 30$  mg/g)

Time to CV death, non-fatal MI, non-fatal stroke, or HHF



14%

reduced risk of CV morbidity and mortality  
 (HR=0.86; 95% CI 0.78–0.95;  
 $p=0.002$ )<sup>1</sup>

22%

reduced risk of first HHF\*  
 (HR=0.78; 95% CI 0.66–0.92;  
 $p=0.003$ )<sup>1</sup>



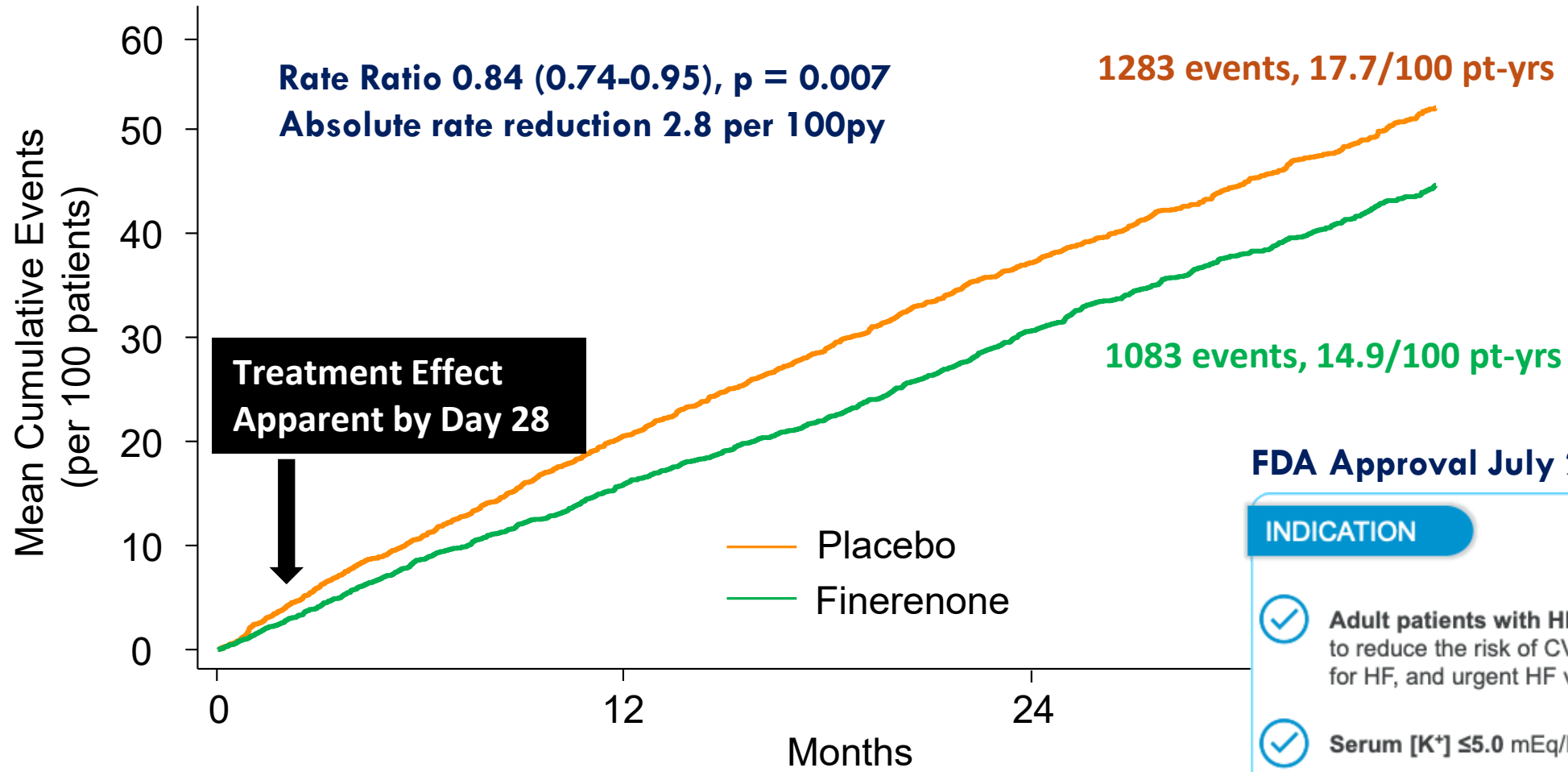
23%

reduced risk of CKD progression<sup>#</sup>  
 (HR=0.77; 95% CI 0.67–0.88;  
 $p=0.0002$ )<sup>1</sup>

20%

reduced risk of ESKD  
 (HR=0.80; 95% CI 0.64–0.99;  
 $p=0.040$ )<sup>1,‡</sup>

# FINEARTS-HF: CV Death and Total HF Events

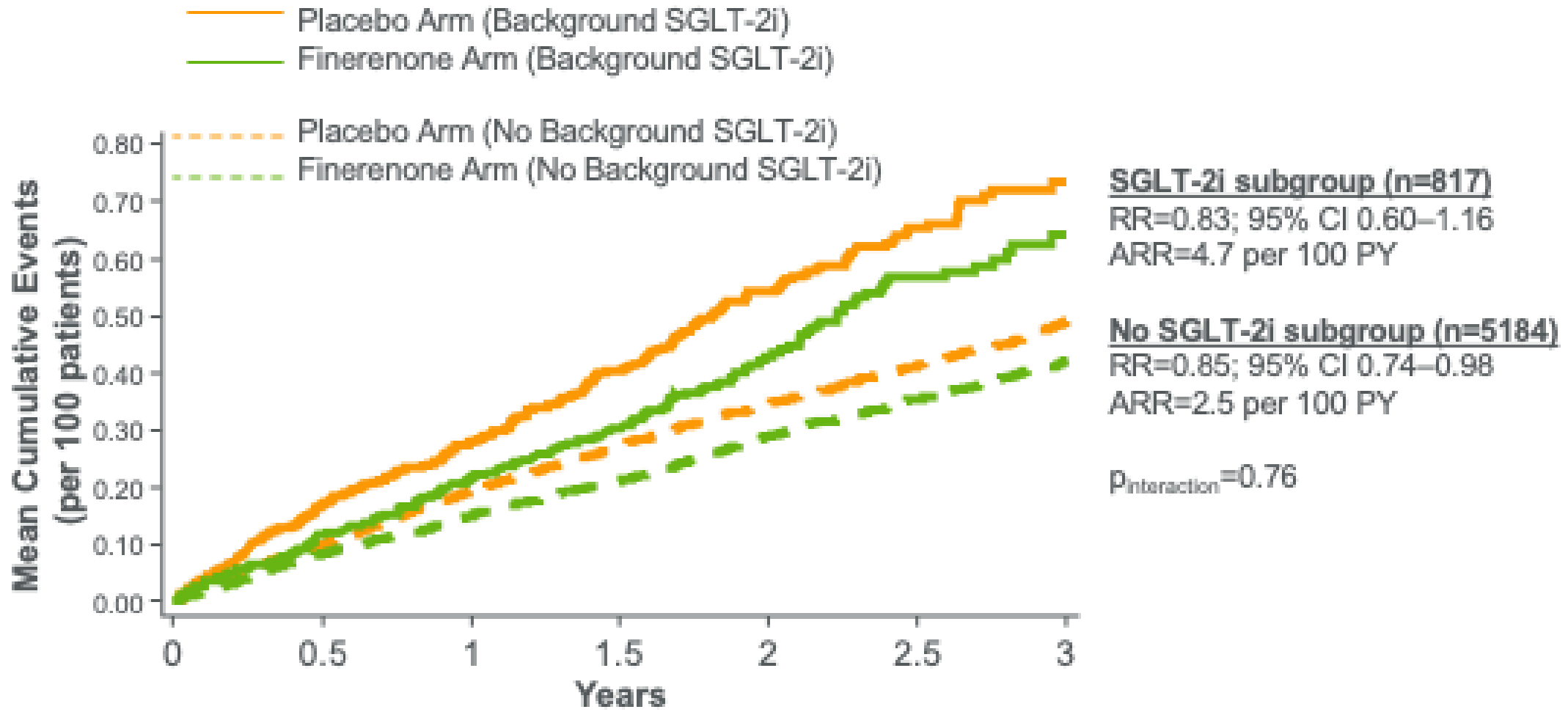


FDA Approval July 2025

INDICATION

- ✓ Adult patients with HF LVEF  $\geq 40\%$  to reduce the risk of CV death, hospitalization for HF, and urgent HF visits
- ✓ Serum  $[K^+] \leq 5.0$  mEq/L
- ✓ eGFR  $\geq 25$  mL/min/1.73 m<sup>2</sup>

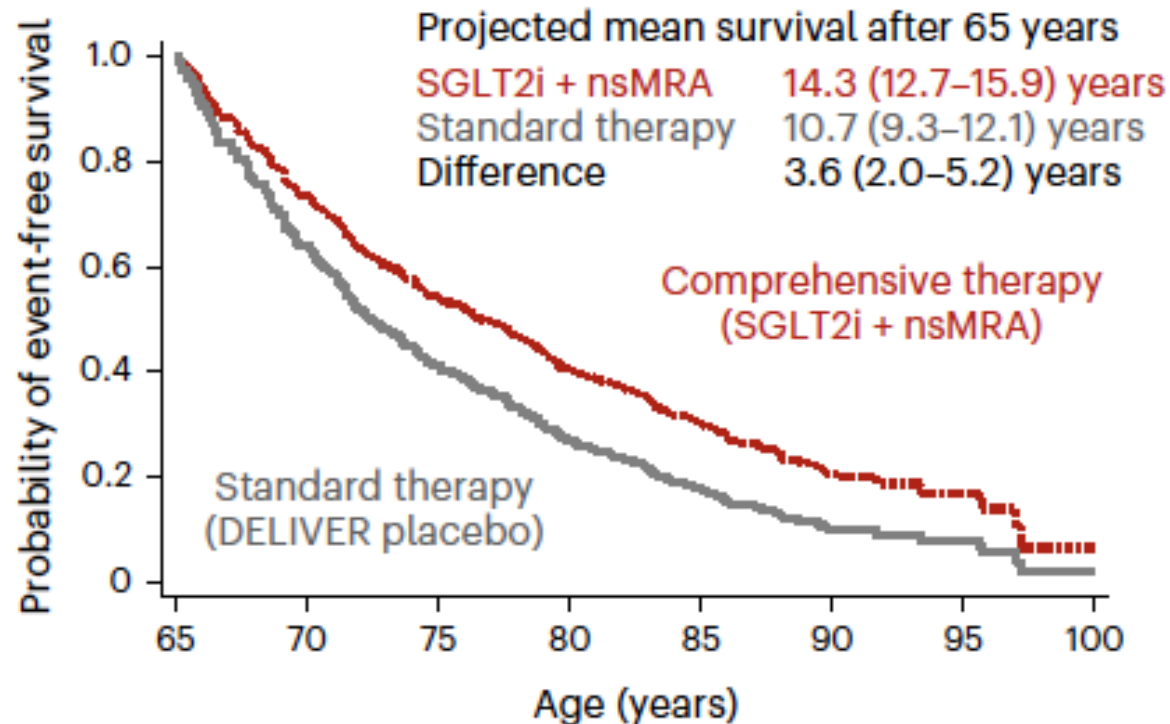
# Additive benefits of nsMRA to SGLT2i



# Projected Lifetime Survival Gains with Comprehensive treatment of HFpEF

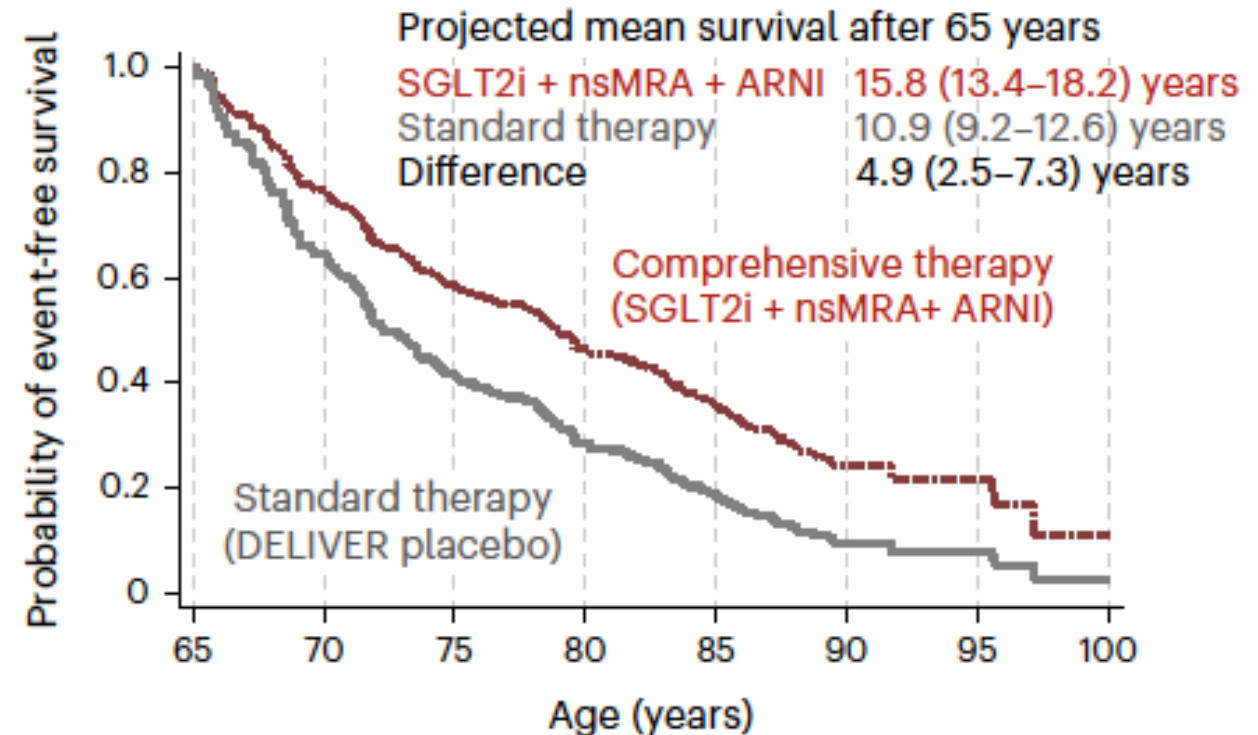
Overall

+ 3.6 yrs with SGLT2i + nsMRA

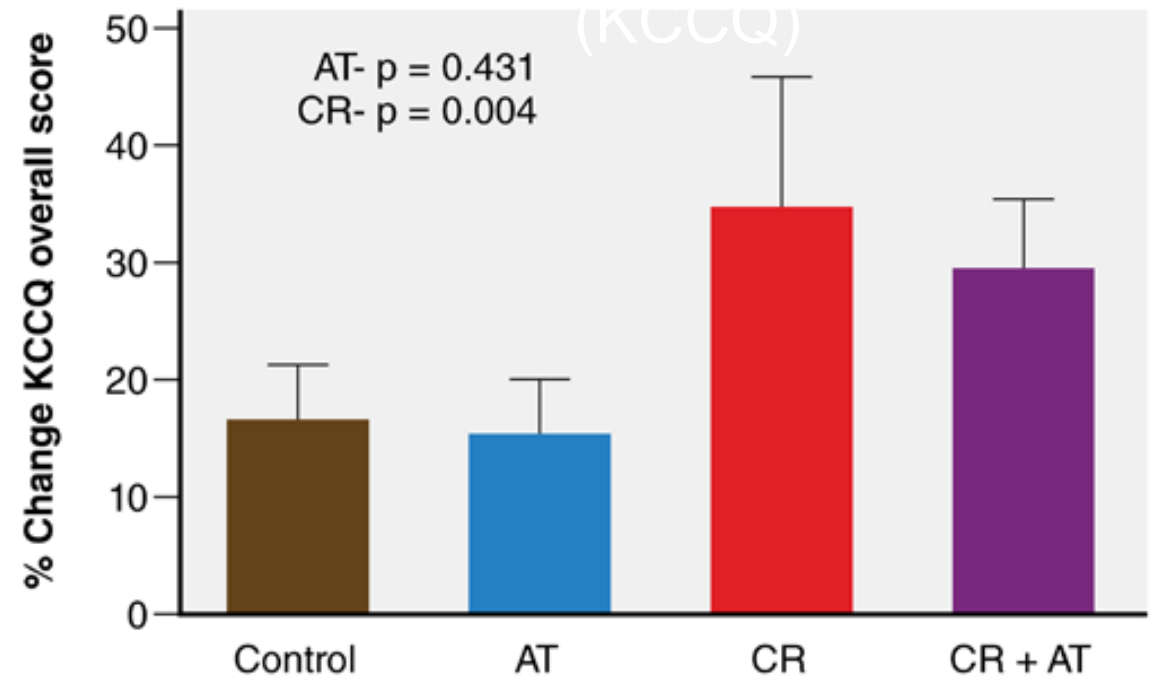
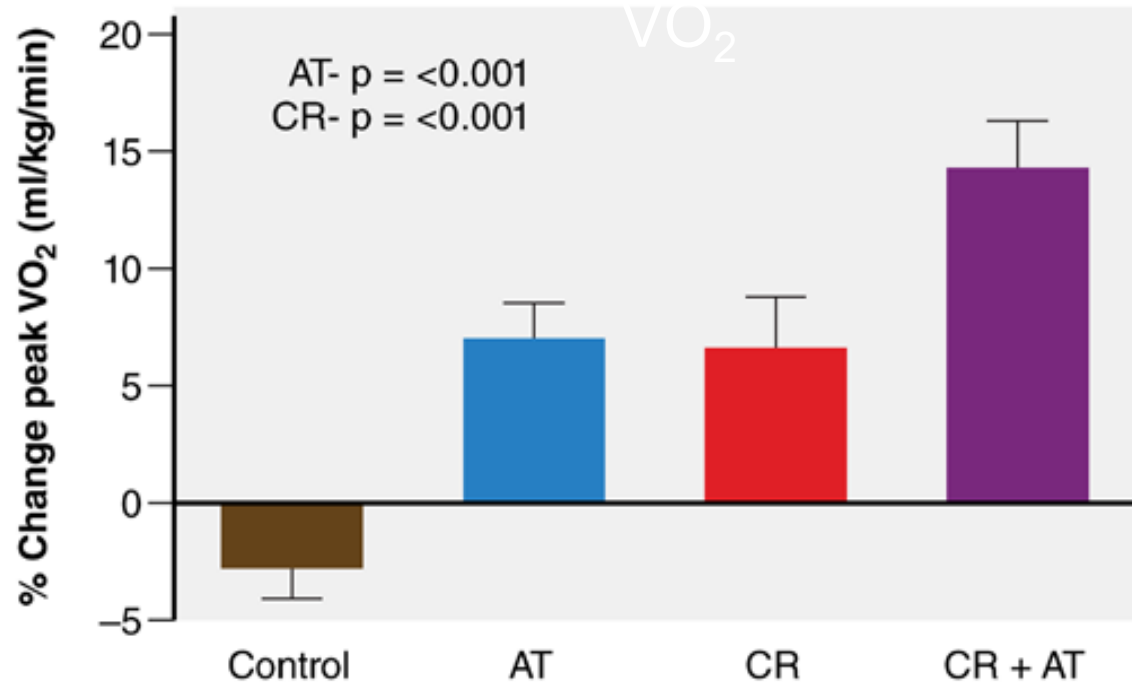


Patients with LVEF below normal

+ 4.9 yrs with SGLT2i + nsMRA + ARNI



# Impact of Lifestyle Modification in HFpEF : Exercise + Calorie Restriction

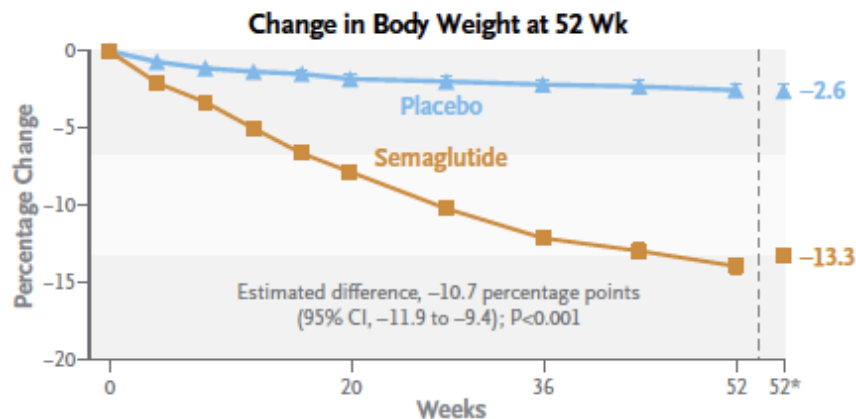
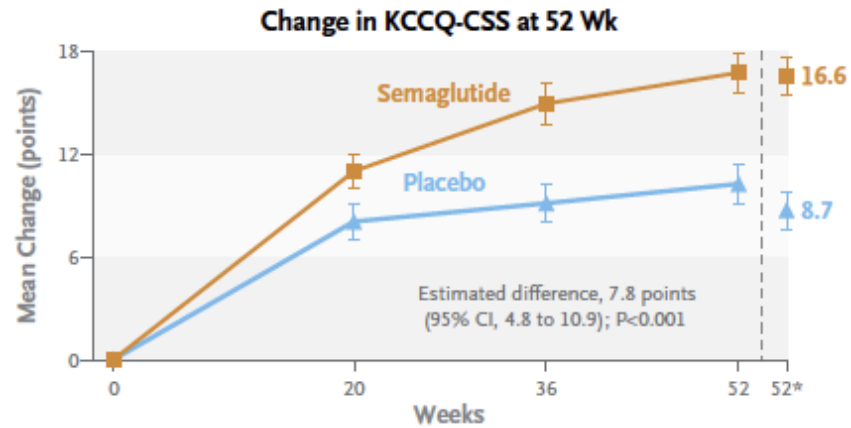


AT = aerobic exercise training, CR = caloric restriction

# GLP-1 RA for HFpEF with Obesity

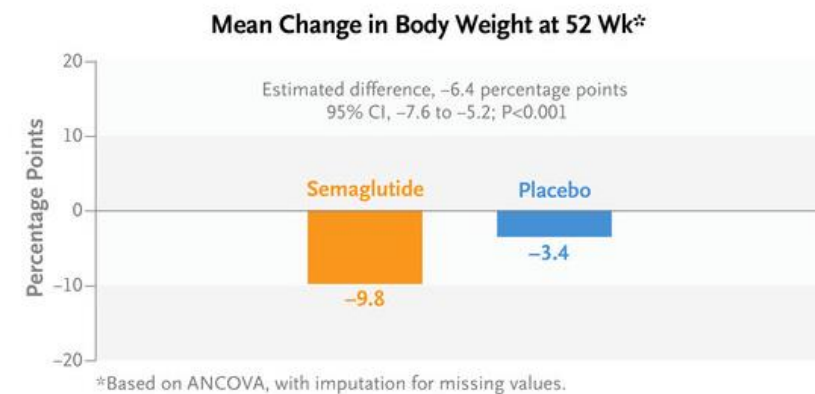
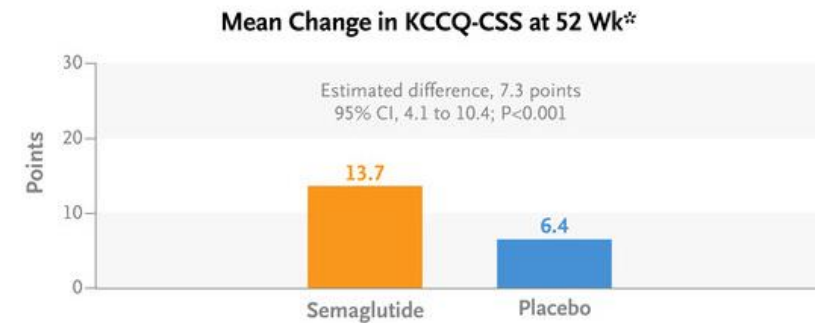
## Semaglutide in Patients with Heart Failure with Preserved Ejection Fraction and Obesity

Kosiborod MN et al. DOI: 10.1056/NEJMoa2306963



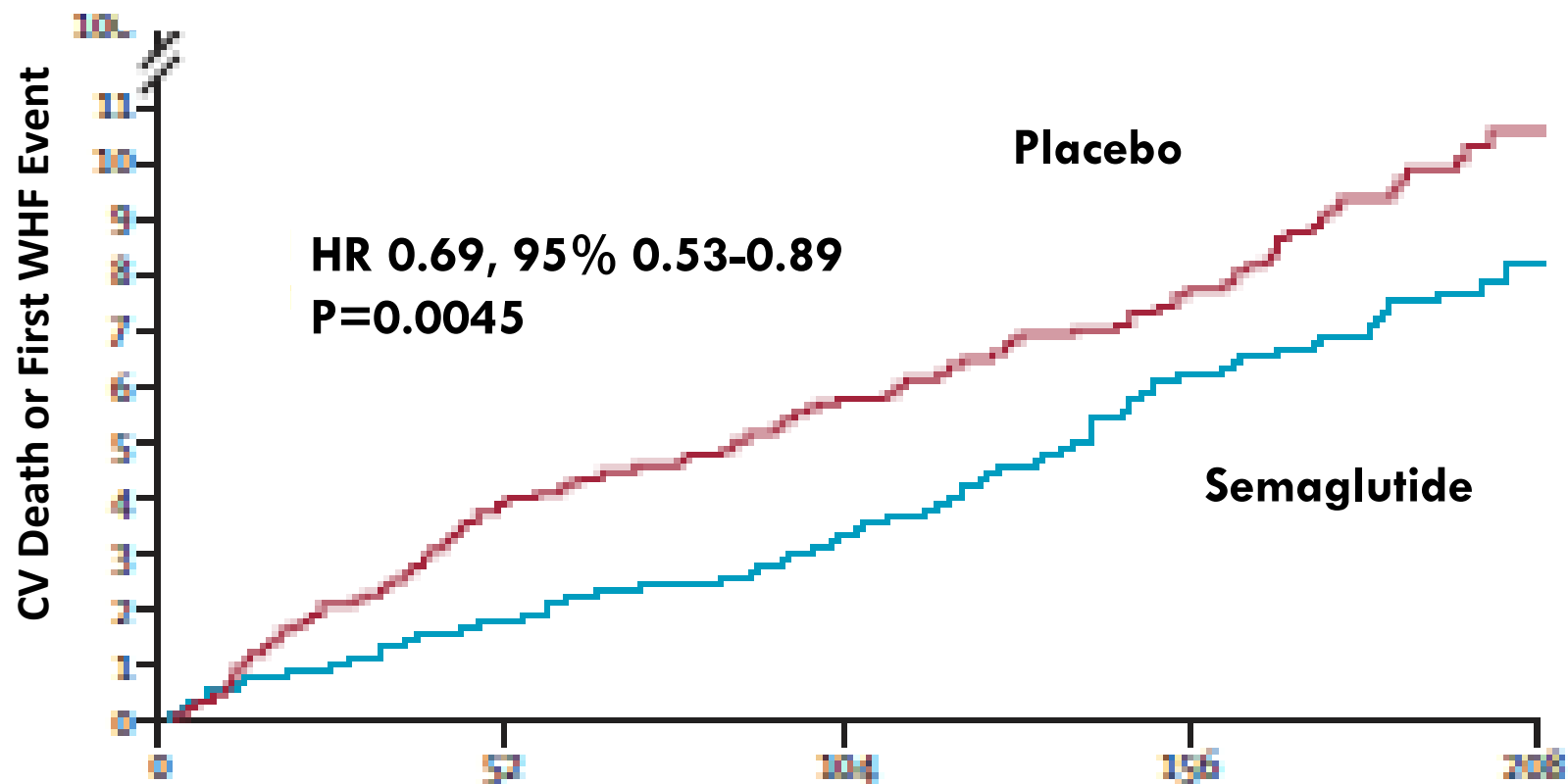
## Semaglutide in Patients with Obesity-Related Heart Failure and Type 2 Diabetes

Kosiborod MN et al. DOI: 10.1056/NEJMoa2313917



# Effect of Semaglutide on CV Outcomes in HFmrEF/HFpEF with Obesity:

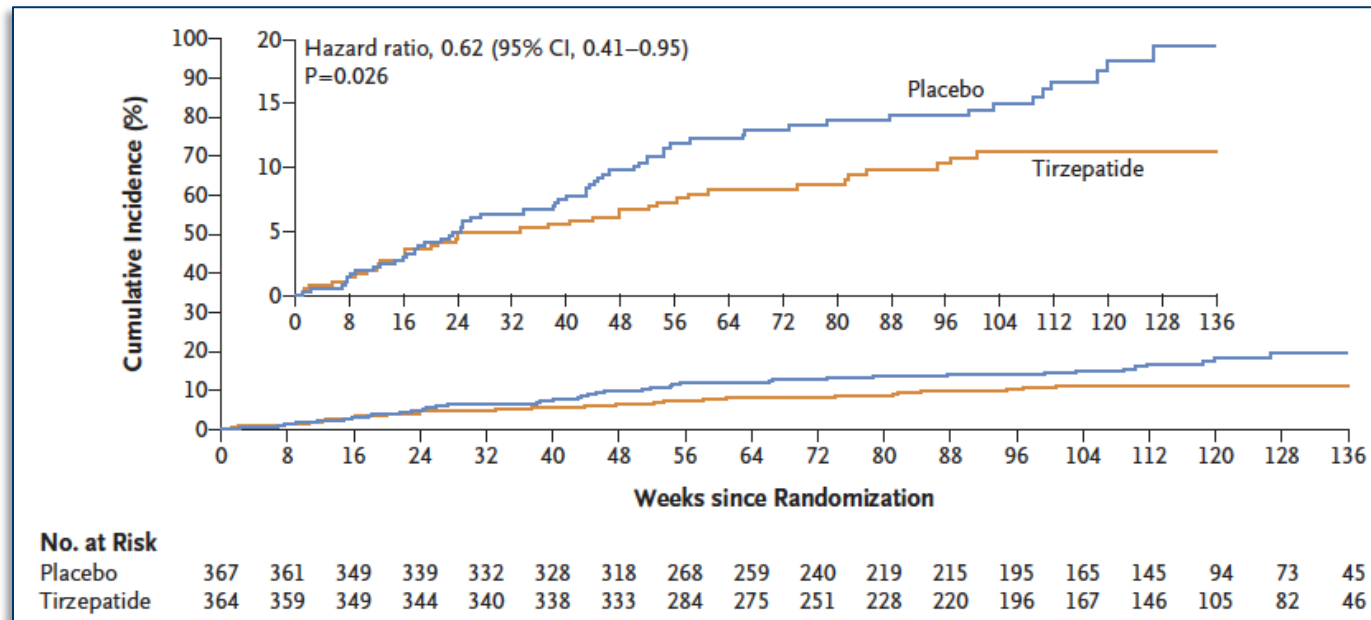
*Pooled data from SELECT, FLOW, STEP-HFpEF, STEP-HFpEF-DM*



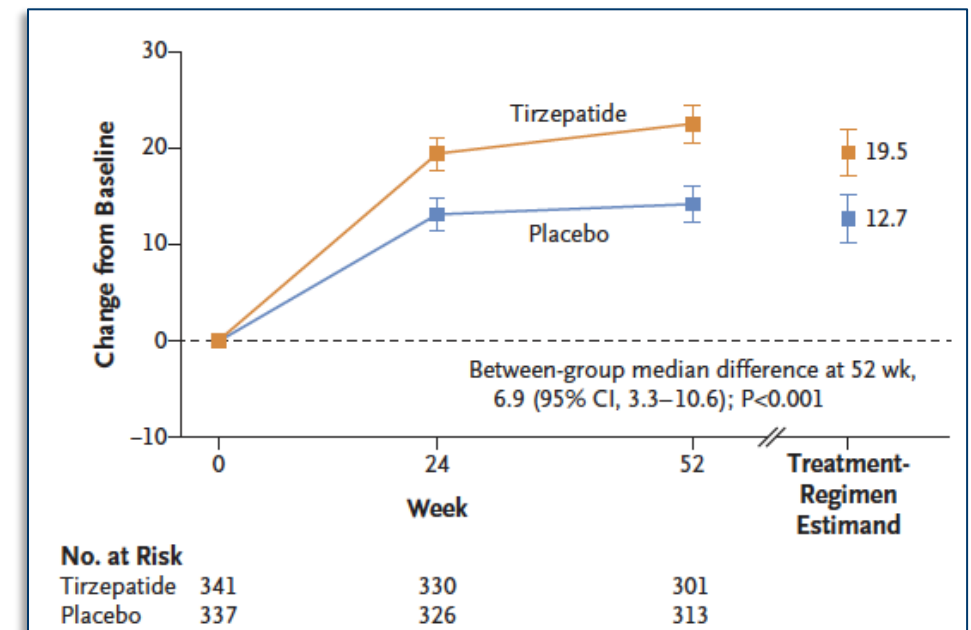
# SUMMIT: Tirzepatide for HFpEF with Obesity

*731 patients with symptomatic HF, LVEF>50%, BMI≥30 kg/m<sup>2</sup>*

CV death or WHF Event



KCCQ-CSS



# Summary: Pharmacologic Therapy for HF

## **HFrEF (LVEF $\leq$ 40%)**

- **ARNI $\gg$ ACEi/ARB**
- **Beta-blocker (evidence-based)**
- **MRA**
- **SGLT2i**

## **HFmrEF (LVEF $\leq$ 41-49%)**

- **ARNI $\gg$ ACEi/ARB**
- **Beta-blocker (evidence-based)**
- **MRA (spiro vs. finerenone)**
- **SGLT2i**

## **HFpEF (LVEF $\leq$ 41-49%)**

- **SGLT2i**
- **ARNI if EF below normal**
- **MRA (finerenone)**
- **GLP1-RA vs. GLP-1/GIP RA**

# **Perioperative Considerations in HF Patients**

- Decompensated HF and shock are associated with high-risk for perioperative complications**
- Optimize congestion/volume status prior to surgery**
- Consider potential for EMI with Implantable devices (ICD/CRT), discuss need for magnet application with EP**
- Typically withhold SGLT2i for 72 hours prior to elective surgery**
- Additional intraoperative monitoring (CVP, A-line, PA catheter) or temporary mechanical support may be appropriate for more advanced HF patients with tenuous hemodynamics**

# When to refer to a HF Specialist

- Recurrent HF hospitalizations
- Intolerance of standard HF therapy
- Ventricular arrhythmias/ICD shocks
- Worsening Renal Function
- Suspicion for infiltrative or familial disease
- Cachexia
- Cardiogenic Shock/Need for inotropes

|          |                                                         |
|----------|---------------------------------------------------------|
| <b>I</b> | Need for <b>inotropes</b>                               |
| <b>N</b> | <b>New</b> York Heart Association Class IV              |
| <b>E</b> | Worsening <b>end-organ</b> dysfunction                  |
| <b>E</b> | <b>Ejection fraction</b> <20%                           |
| <b>D</b> | <b>Defibrillator</b> shocks for ventricular arrhythmias |
| <b>H</b> | Recurrent <b>HF</b> hospitalizations                    |
| <b>E</b> | <b>Escalating</b> diuretic dose                         |
| <b>L</b> | <b>Low</b> blood pressure                               |
| <b>P</b> | <b>Progressive</b> intolerance of GDMT                  |

# Summary

- **HF is a clinical diagnosis, but use of NP may help**
- **All HF patients require thorough workup of etiology, treatment of reversible factors, aggressive comorbidity management and lifestyle modification**
- **Optimal pharmacologic therapy of HFrEF ( $\leq 40\%$ ) and HFmrEF (41-49%) includes ARNI, Beta-blocker, MRA, SGLT2i at target doses**
- **Device therapy (ICD/CRT) may be appropriate for selected patients with HFrEF**
- **SGLT2i are first-line therapy for HFpEF regardless of diabetes**
- **Aggressively manage Obesity, Diabetes, Hypertension to Prevent HF**

*Thank You!*  
*@akshaydesaimd*

ESC Congress  
Paris 2019

Together with  
World Congress  
of Cardiology



[www.brighamandwomens.org/heart](http://www.brighamandwomens.org/heart)