2026 Best Care Practices in the Post-Acute and Long-Term Care (PALTC) Conference

Heart Failure in Older Adults: The Heartening Journey for Primary Care

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This presenter has no relevant financial relationship with commercial interests.

Objectives

- Highlight the high mortality associated with heart failure
- Relay understanding of how to diagnose heart failure
- Describe evidence-based treatments
- Convey the impact that changes in medicine over one's career can have on humility in counseling patients

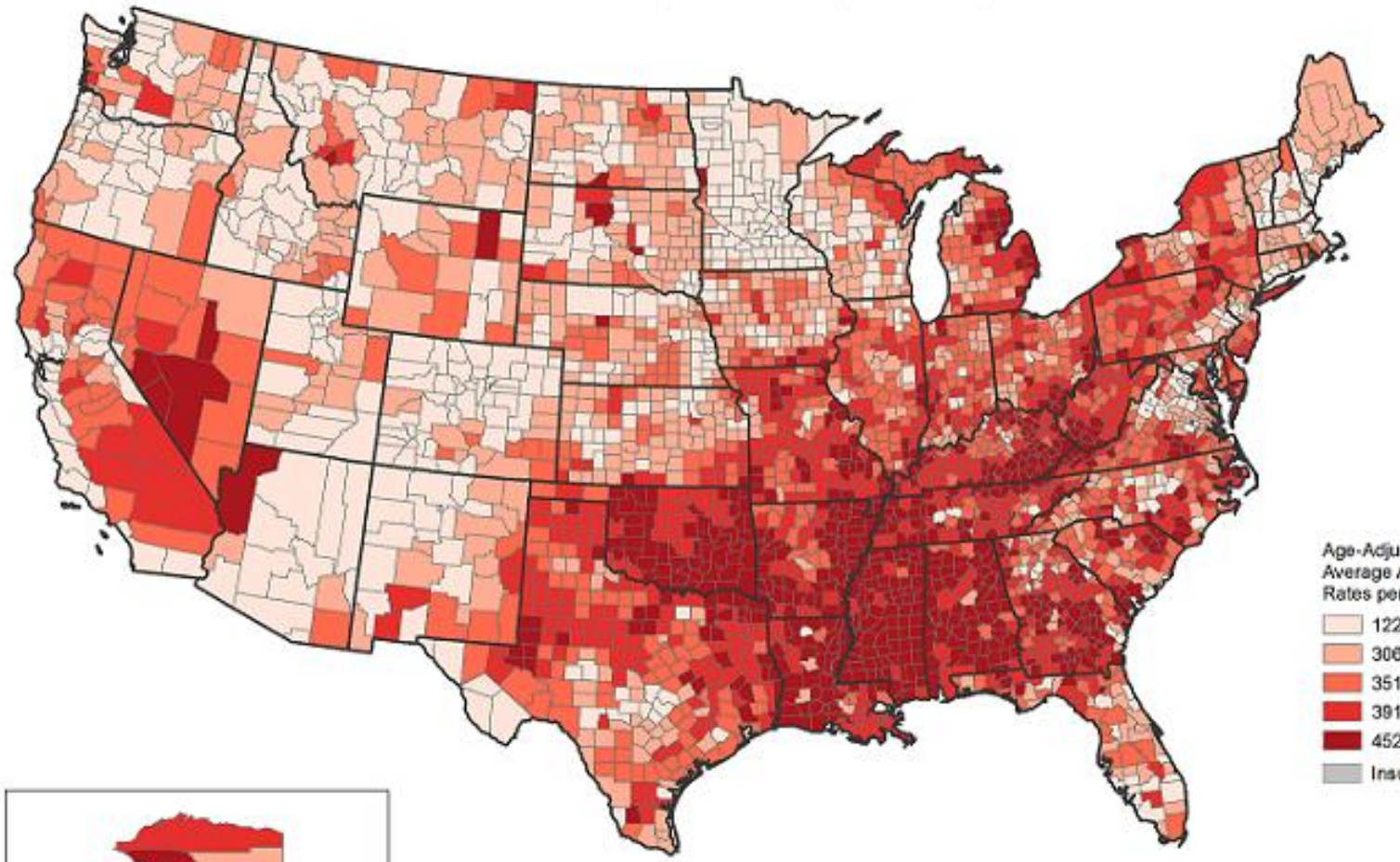
Definition

Heart failure is the inability of the heart to meet the metabolic demands of the body while maintaining normal filling pressures.

Heart Failure (HF) in the US

- Prevalence: 6.5 million
- The incidence of CHF is equally frequent in men and women
- African-Americans are 1.5 times more likely to develop heart failure than Caucasians.
- Heart failure is responsible for 11 million physician visits each year, and more hospitalizations than all forms of cancer combined.
- 1 in 8 deaths in 2017 included heart failure as contributing cause
- ≥80 y, 40% mortality during mean 27-mo follow-up
- Total cost $30.7 billion (2011) and projected to $50 billion by 2030

Heart Disease Death Rates, 2008-2010
Adults, Ages 35+, by County



Age-Adjusted
Average Annual
Rates per 100,000

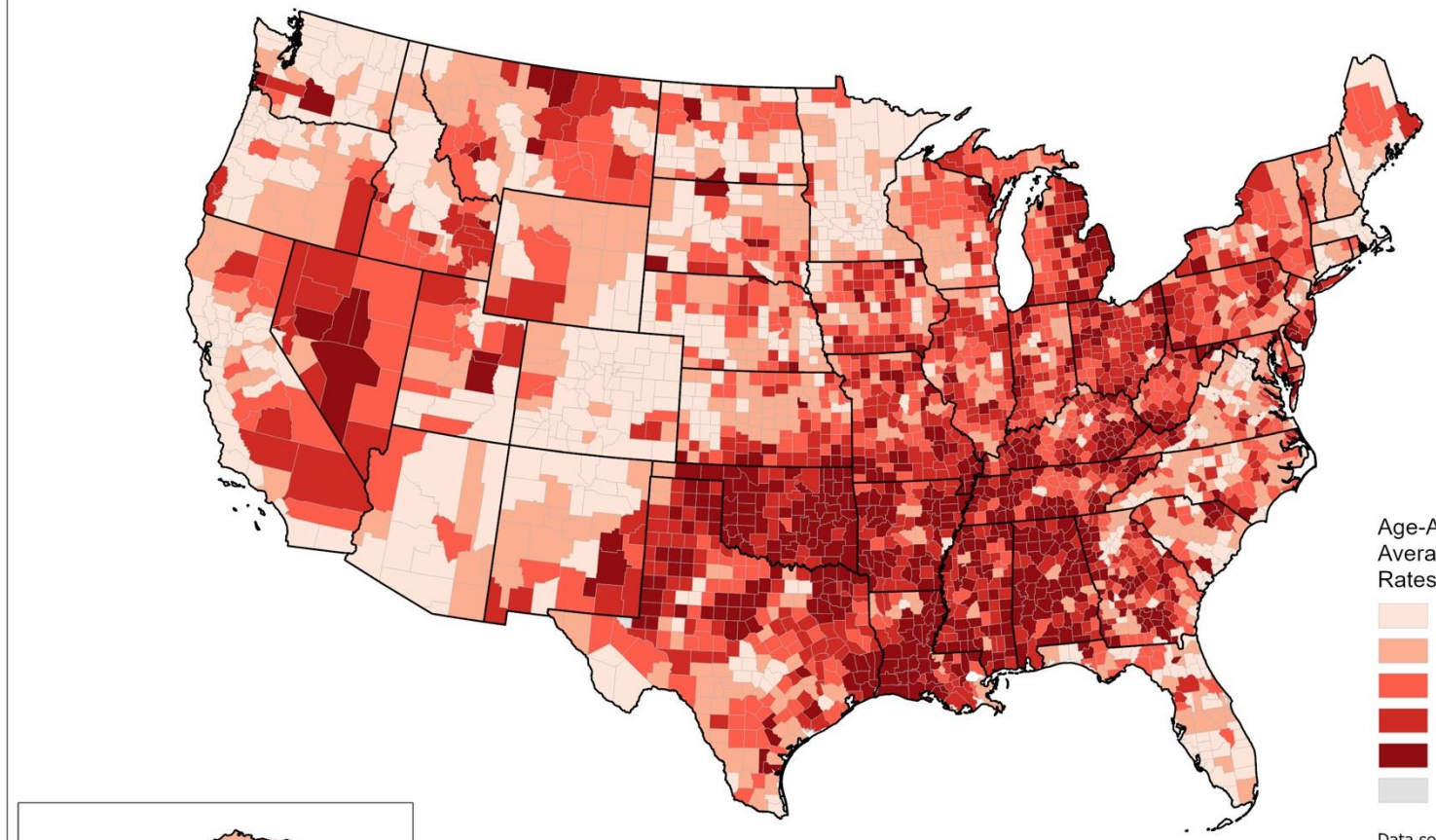
- 122.5 - 306.2
- 306.3 - 350.9
- 351.0 - 391.6
- 391.7 - 451.9
- 452.0 - 846.1
- Insufficient Data

Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics

CDC

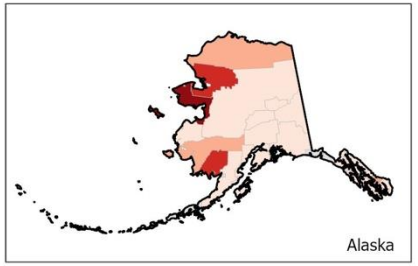
Heart Disease Death Rates, 2018 - 2020
Adults, Ages 65+, by County

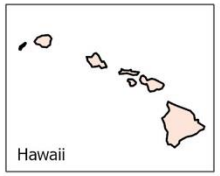


Age-Adjusted
Average Annual
Rates per 100,000

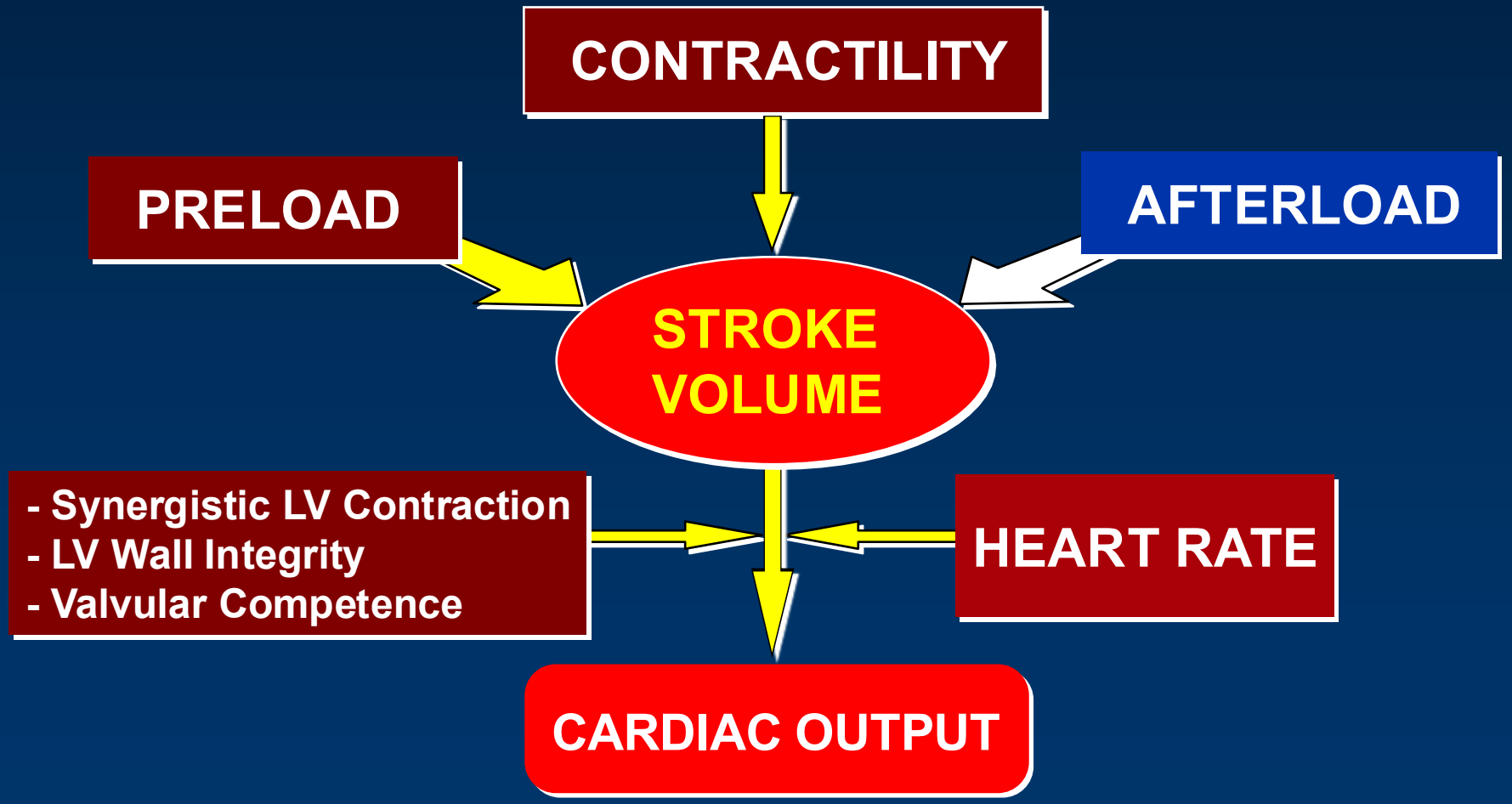
- 15.9 - 927.8
- 927.9 - 1036.3
- 1036.4 - 1149.3
- 1149.4 - 1292.4
- 1292.5 - 2719.4
- Insufficient Data

Data source and
methodology found at:
www.cdc.gov/dhdsp/maps/
atlas/statistical-methods





Determinants of Ventricular Function



What are the some of the causes of heart failure?

- Ischemia (myocardial changes)
- Infection (hemodynamic)
- Valvular (mechanical changes)
- Infiltrative (ventricular dyssynergy)
- Toxin (combinations)
- Electrical (changes in cardiac rhythm)

No longer appropriate to use the term

“Congestive Heart Failure”

Aggravating Factors

- Endocarditis
- Obesity
- Physical activity
- Medications
- Dietary excess
- Arrhythmias (atrial fibrillation)
- Type 2 diabetes
- CAD
- Malignancy
- Pregnancy
- Infections
- Thromboembolism
- Hyperthyroidism
- Hypothyroidism
- Anemia
- Iron deficiency
- Hypertension
- Sleep disorders

A NON-PROFIT ORGANIZATION

How is heart failure categorized physiologically?

- HF with reduced ejection fraction (Systolic Dysfunction) (HFrEF)
- HF with preserved ejection fraction (Diastolic Dysfunction) (HFpEF)
- HF with improved EF: LVEF ≤40% ->LVEF >40% (HFimpEF)
- HF with mildly reduced EF: LVEF 41-49% (HFmrEF)

ACC/AHA Guidelines

Types of Heart Failure

- HFrEF- most common initially
  - Inotropic failure
  - LVEF < 50%
- HFpEF
  - Compliance abnormality
  - LVEF ≥ 50%
  - LVEF is preserved in at least two-thirds of older adults with the diagnosis of HF (similar mortality)
- Most patients have both, eventually….

A 2-D Echocardiogram is the single most useful test in heart failure

Diagnosis

There is no single diagnostic test for heart failure because it is largely a clinical diagnosis that is based on a careful history and physical examination.

- **Fatigue, exertional dyspnea, orthopnea**
- **Edema, rales**
- **B-type natriuretic peptide (BNP)**
- **Echo**

BNP level is clinically useful

- Levels elevated in HF
  - Confirms diagnosis made on clinical grounds
- Other causes:
  - LVH, myocarditis, cirrhosis
  - Generally higher levels in HF
  - 90% sensitive, 75% specific
- Can be used to rule out HF—***if normal then HF unlikely***

Determining Treatment

Once you identify the patient as having heart failure, how do you determine the best treatment?

- Evaluate and treat secondary causes
- Assess left ventricular ejection fraction (LVEF)
- Determine ACC/AHA Stage
- Determine NYHA class

Stages/Class of Heart Failure

Asymptomatic

Symptomatic

A At high risk for HF but without structural heart disease or symptoms of HF (e.g., patients with HTN or CAD)	
B Structural heart disease but without sxs	
C Structural heart disease with prior or current symptoms of HF	
D Refractory/advanced HF requiring specialized interventions	

NYHA Class

Class I Asymptomatic: No limitation of phys'l activity. Ordinary activity does not cause sxs.
II Symptomatic with moderate exertion. Ordinary physical activity causes SOB, fatigue
III Symptomatic with minimal exertion. Less than usual activity causes sxs
IV Symptomatic at rest. Unable to carry on any activity without discomfort.

ACC/AHA Guidelines

Components of Treatment

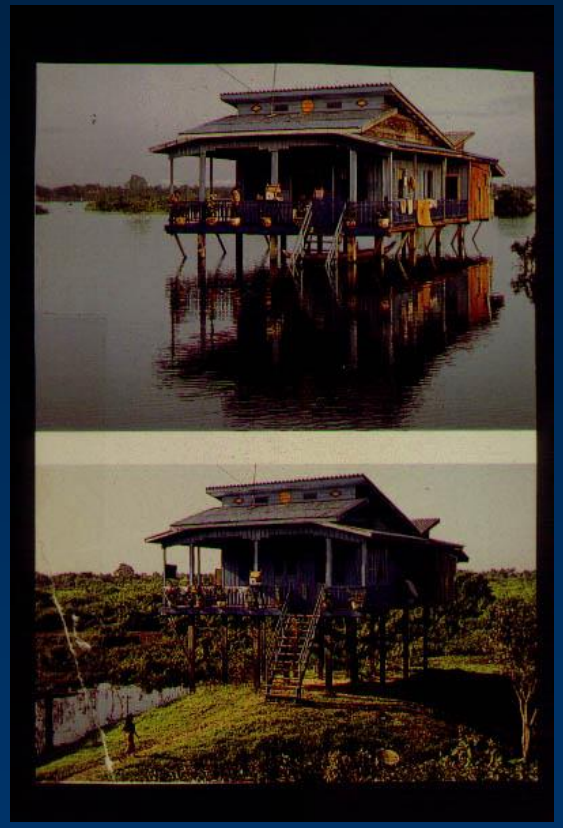
- Symptom management
- Medication use
- Emergencies
- Work
- Healthcare team
  - Working with providers
  - Caregivers
- Lifestyle changes
  - Tobacco cessation
  - Nutrition
  - Exercise
  - Stress reduction
- Psychological responses
- Community resources

A NON-PROFIT ORGANIZATION

FDA-Approvals for HF

- A useful way to present the history is based on eras of approval:
- 1960s–1980s: Diuretics → digoxin → ACE inhibitors → IV inotropes
- 1990s–2000s: ARBs → β-blockers → MRAs → hydralazine/isosorbide dinitrate

Commonly Used Diuretics



Diuretic	Initial Daily Dose (mg)	Maximum Daily Dose (Mg)
Thiazide Diuretics		
HCTZ	12.5	25 mg
Metolazone	2.5	10
Loop Diuretics		
Furosemide	20	480
Bumetanide	0.5	10
Torsemide	10	200

Digitalis

- Digoxin can be beneficial in patients with HFrEF and sinus rhythm to **decrease hospitalizations for HF**: *consider adding if on other therapy and still symptomatic*

- Digoxin can be used in HF patients with atrial fibrillation to help rate control

- **Dose: 0.125 -0.25 mg qd depending on renal function (levels not for dosing but for toxicity)
- **Interaction with amiodarone, which ↑ Digoxin levels
- **BEERS LIST of drugs to be avoided in older adults

Use of Beta Blockers in HFrEF

- Indicated for symptomatic or asymptomatic EF ≤40%.
- Use agents and target doses used in clinical trials.
- Initiate when relatively euvolemic, off IV vasoactive agents and prior to hospital d/c.
- Titrate upward every 2 to 4 weeks as long as stable.
- Most trials held titration for HR <60 or SBP <90.

ACC/AHA Guidelines

Aldosterone Antagonists

- Aldosterone receptor antagonists [or mineralocorticoid receptor antagonists (MRA)] are recommended with NYHA class II-IV and who have LVEF of ≤ 35%.
- Patients with NYHA class II should have a history of prior cardiovascular hospitalization or elevated plasma natriuretic peptide.
- Creatinine should be ≤ 2.5 mg/dL or less in men or ≤ 2.0 mg/dL in women (or eGFR >30 mL/min/1.73m2) and potassium < 5.0 mEq/L.
- Careful monitoring of potassium.

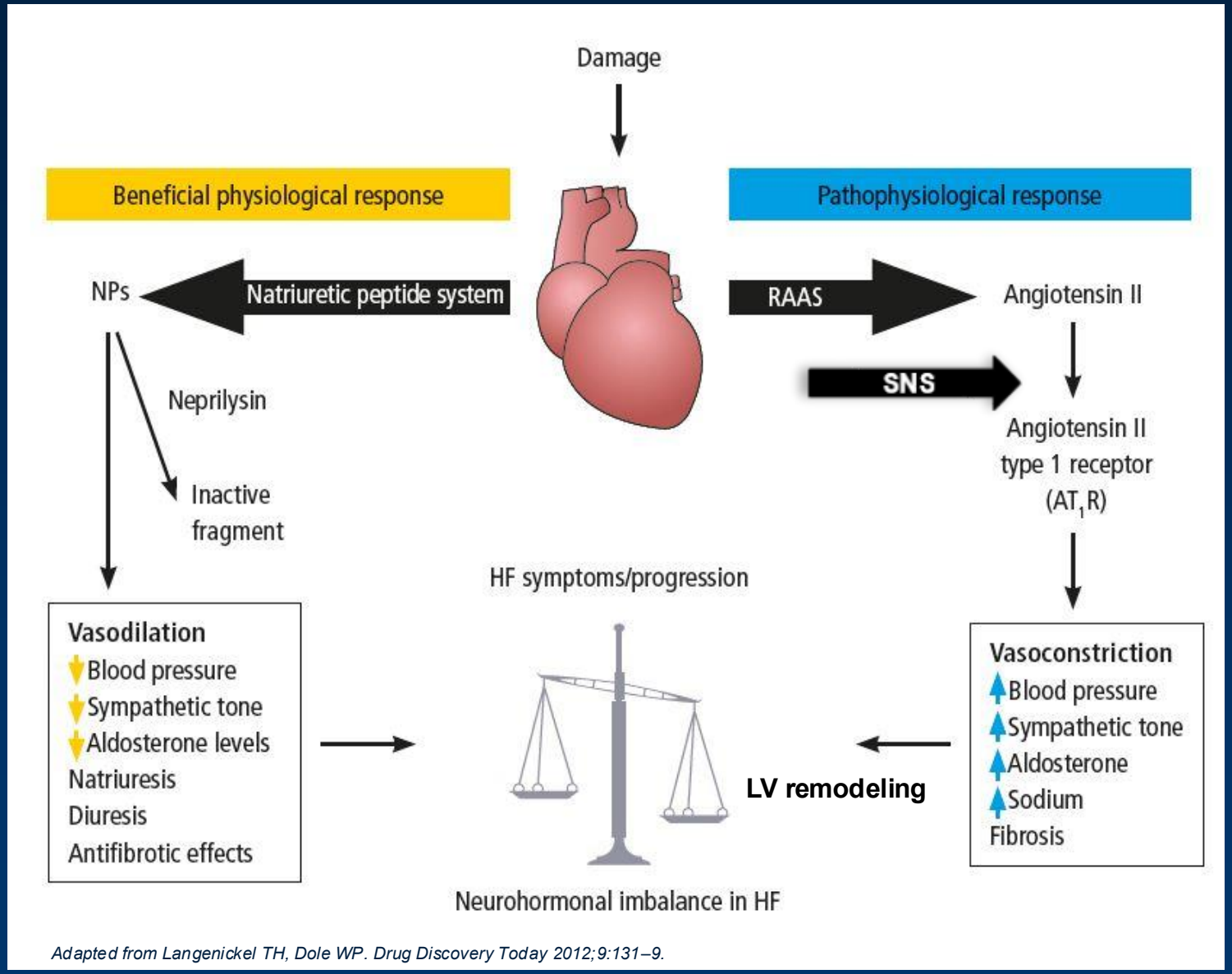
ACC/AHA Guidelines

Nitrate/Hydralazine (ISDN/HDZ)

- HDZ/ISDN combination is recommended for **African Americans with NYHA class III–IV HFrEF receiving optimal therapy with ACE inhibitors and beta blockers**.

- HDZ/ISDN can be useful to reduce morbidity or mortality in patients with current or prior symptomatic HFrEF who **cannot be given an ACE inhibitor or ARB** because of drug intolerance, hypotension, or renal insufficiency, unless contraindicated.

Therapeutic Targets



Adapted from Langenickel TH, Dole WP. Drug Discovery Today 2012;9:131–9.

SNS= sympathetic nervous system
RAAS= Renin angiotensin aldosterone system

FDA-Approvals for HF

- A useful way to present the history is based on eras of approval:
- 1960s–1980s: Diuretics → digoxin → ACE inhibitors → IV inotropes
- 1990s–2000s: ARBs → β-blockers → MRAs → hydralazine/isosorbide dinitrate
- 2015: Sacubitril/valsartan → ivabradine
- 2020–2021: Dapagliflozin → empagliflozin → vericiguat
- 2025: Finerenone for HF with LVEF ≥40%

Management Considerations

ACC/AHA HF Guidelines

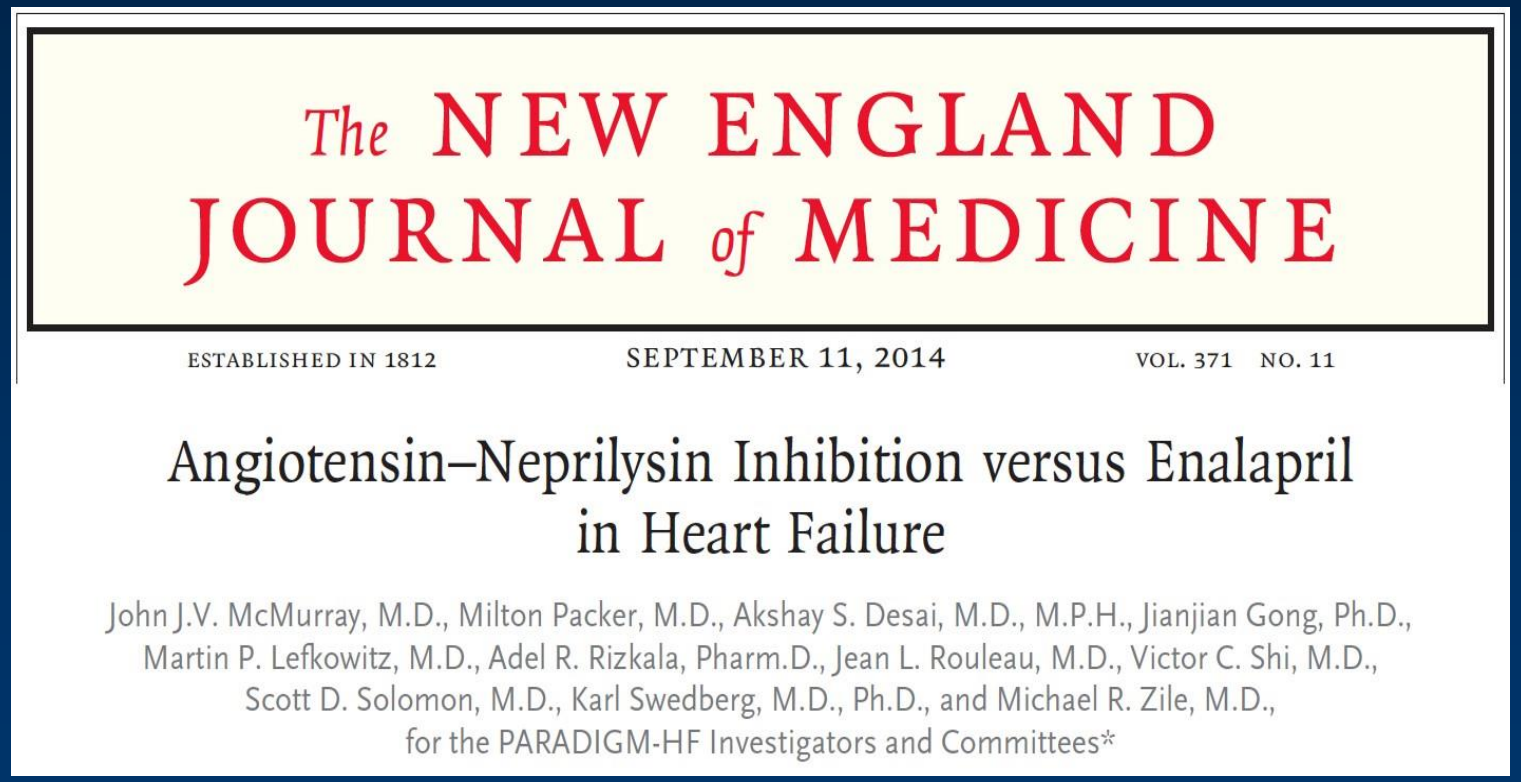
- Assessment of LV function: echocardiogram
- Medications:
  - 1) renin-angiotensin system inhibition (RASi) with angiotensin receptor-neprilysin inhibitors (ARNi, e.g. valsartan/sacubitril), angiotensin-converting enzyme inhibitors (ACEi), or angiotensin (II) receptor blockers (ARB) alone;
  - 2) beta blockers;
  - 3) mineralocorticoid receptor antagonists (MRA); and
  - 4) sodium-glucose cotransporter-2 inhibitors (SGLT2i).
  - Anticoagulation if AF
  - Consider: loop diuretics (symptom control; no survival benefit)

Management Considerations

ACC/AHA HF Guidelines

- ARNi is now recommended as first-line RASi to reduce morbidity and mortality in HFrEF (Class of Recommendation 1a)
- SGLT2i is now recommended to reduce hospitalization and cardiovascular mortality (Class of Recommendation 1a).

Neprilysin Inhibitor – PARADIGM HF Trial*



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 SEPTEMBER 11, 2014 VOL. 371 NO. 11

Angiotensin–Neprilysin Inhibition versus Enalapril in Heart Failure

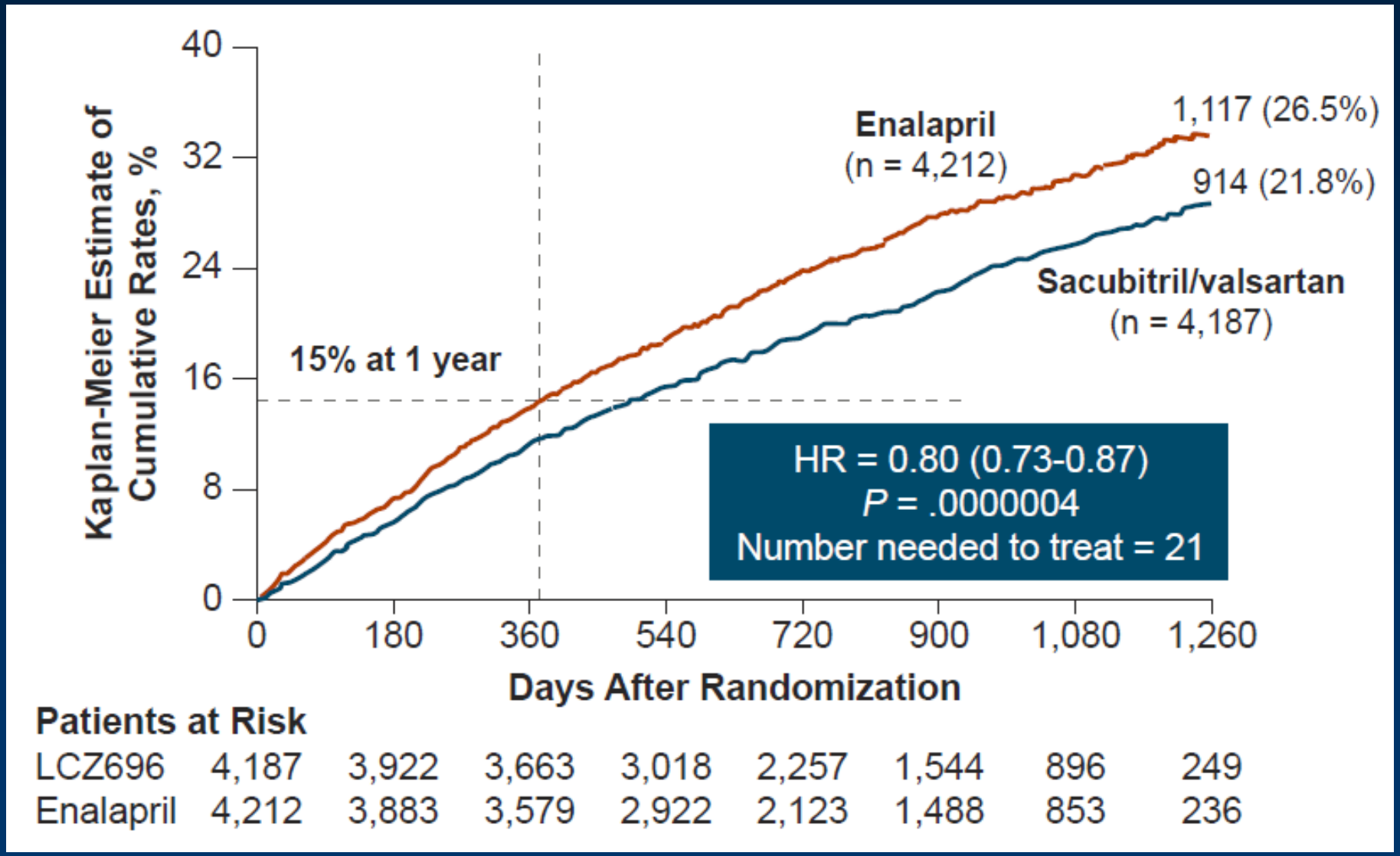
John J.V. McMurray, M.D., Milton Packer, M.D., Akshay S. Desai, M.D., M.P.H., Jianjian Gong, Ph.D., Martin P. Lefkowitz, M.D., Adel R. Rizkala, Pharm.D., Jean L. Rouleau, M.D., Victor C. Shi, M.D., Scott D. Solomon, M.D., Karl Swedberg, M.D., Ph.D., and Michael R. Zile, M.D., for the PARADIGM-HF Investigators and Committees*

*Prospective Comparison of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure

What's Neprilysin?

- Neutral endopeptidase produced by many tissues but markedly so by the kidney and lung
- Cleaves peptides and it inactivates several peptide hormones
  - Glucagon
  - Enkephalins – endogenous opioids in the CNS
  - Oxytocin – vasopressin-like properties
  - Angiotensin II - vasoconstrictor
  - Endothelin – vasoconstrictor
  - Bradykinin
  - Atrial natriuretic factor – powerful vasodilator and promotes natriuresis (opposite effect of aldosterone)

PARADIGM-HF:
CV Death or HF Hospitalization (Primary Endpoint)



1. McMurray JJ et al. N Engl J Med. 2014;371:993-1004

PARADIGM-HF Conclusions

- More effective than ACEI in reducing death from cardiovascular causes or hospitalization for HF
- Superior to enalapril in reducing all cause mortality and symptoms/physical limitations from HF
- Significance of findings apparent across all subgroups
- Strong evidence that ARNI's are superior to inhibition of the ACEI/ARB alone

Morrow DA, Velazquez EJ, Desai AS, et al. *Sacubitril/Valsartan in Patients Hospitalized With Decompensated Heart Failure.* J Am Coll Cardiol. 2024 Mar 26;83(12):1123-1132. doi: 10.1016/j.jacc.2024.01.027.

Angiotensin-Neprilysin Inhibition in Heart Failure: PIONEER-HF Trial

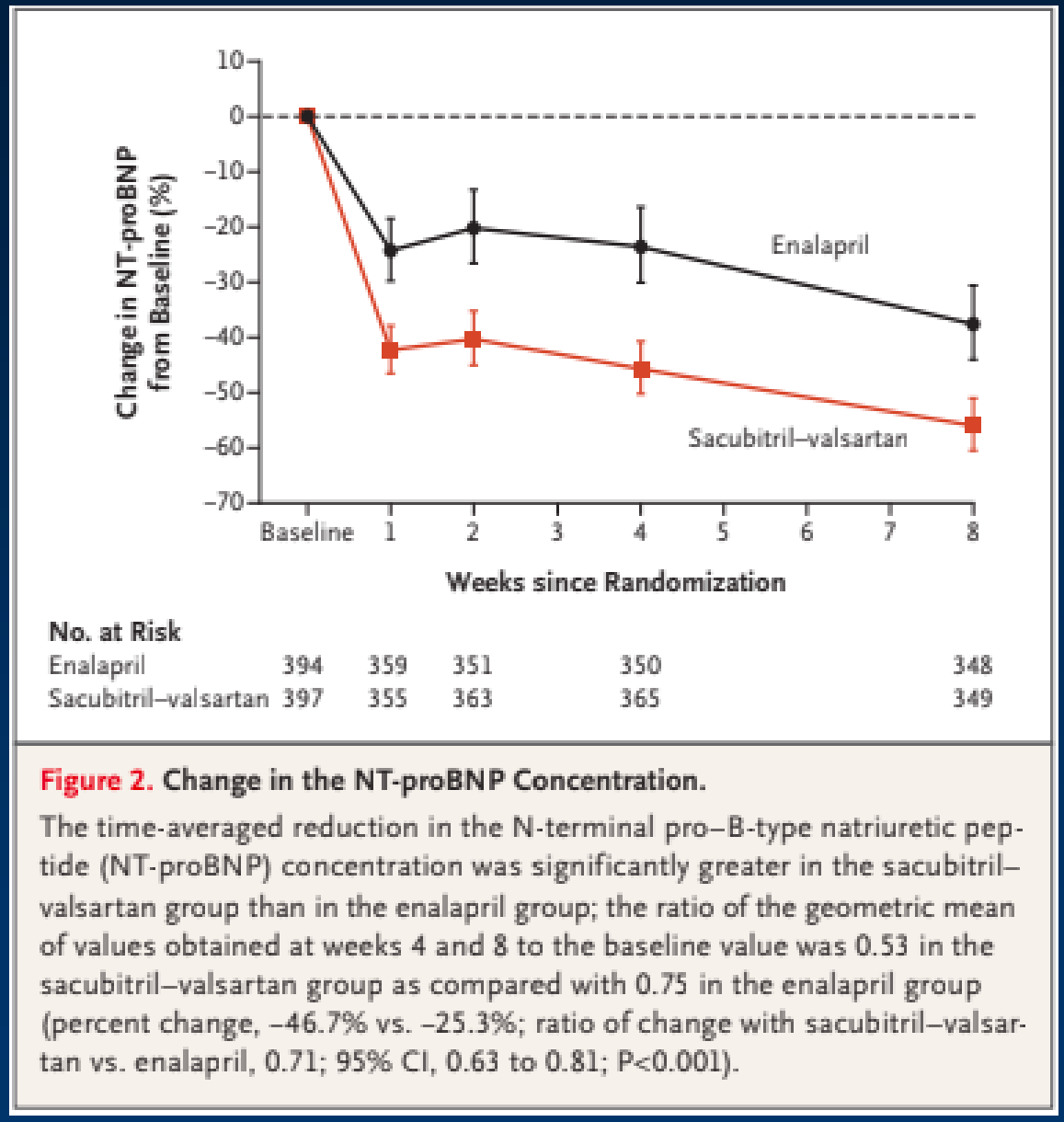


Figure 2. Change in the NT-proBNP Concentration.

The time-averaged reduction in the N-terminal pro–B-type natriuretic peptide (NT-proBNP) concentration was significantly greater in the sacubitril–valsartan group than in the enalapril group; the ratio of the geometric mean of values obtained at weeks 4 and 8 to the baseline value was 0.53 in the sacubitril–valsartan group as compared with 0.75 in the enalapril group (percent change, −46.7% vs. −25.3%; ratio of change with sacubitril–valsartan vs. enalapril, 0.71; 95% CI, 0.63 to 0.81; P<0.001).

N Engl J Med 2019;380:539-48. DOI: 10.1056/NEJMoa1812851

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 NOVEMBER 21, 2019 VOL. 381 NO. 21

Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction

J.J.V. McMurray, S.D. Solomon, S.E. Inzucchi, L. Køber, M.N. Kosiborod, F.A. Martinez, P. Ponikowski, M.S. Sabatine, I.S. Anand, J. Bělohlávek, M. Böhm, C.-E. Chiang, V.K. Chopra, R.A. de Boer, A.S. Desai, M. Diez, J. Drozdz, A. Dukát, J. Ge, J.G. Howlett, T. Katova, M. Kitakaze, C.E.A. Ljungman, B. Merkely, J.C. Nicolau, E. O'Meara, M.C. Petrie, P.N. Vinh, M. Schou, S. Tereshchenko, S. Verma, C. Held, D.L. DeMets, K.F. Docherty, P.S. Jhund, O. Bengtsson, M. Sjöstrand, and A.-M. Langkilde, for the DAPA-HF Trial Committees and Investigators*

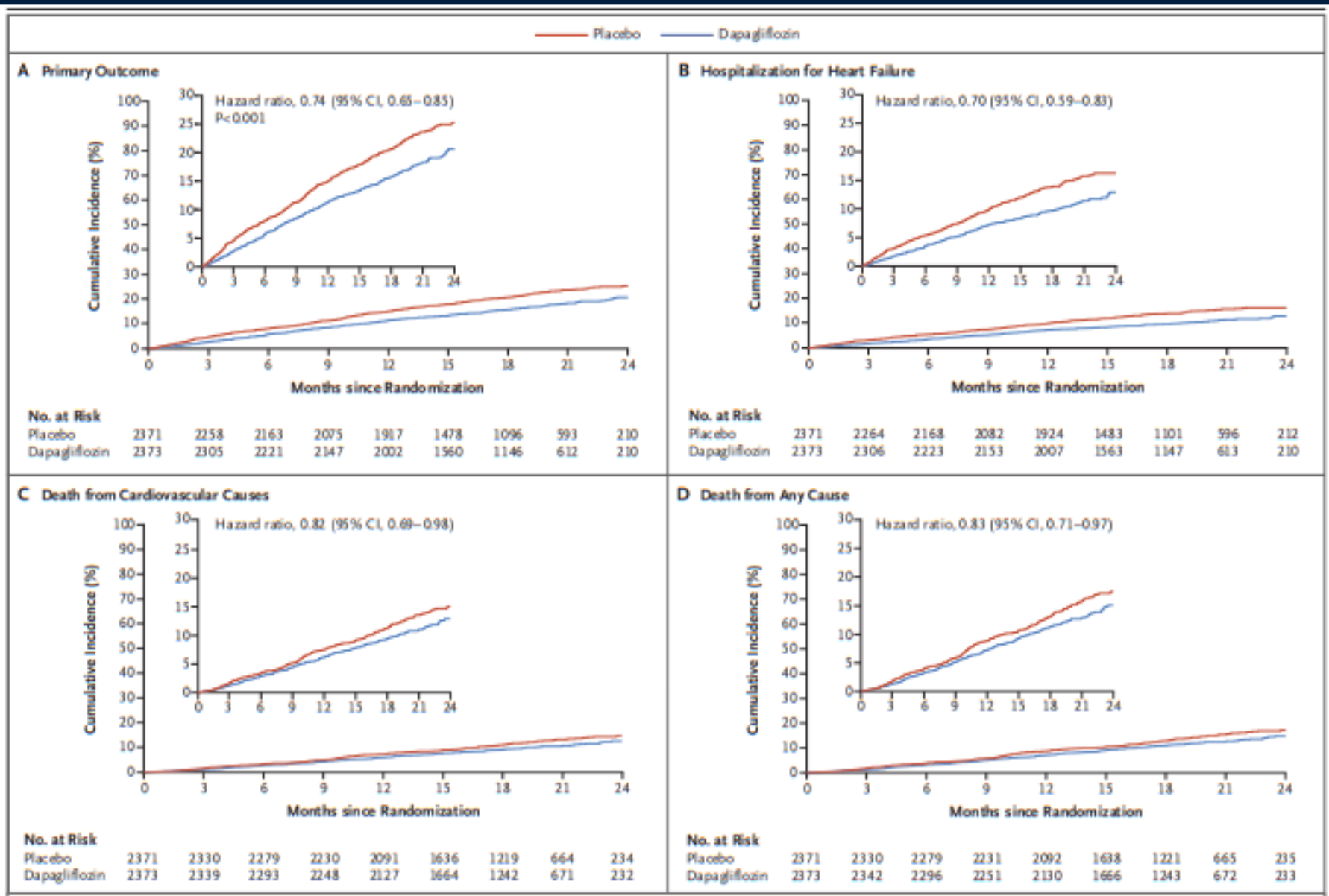


Figure 2. Cardiovascular Outcomes.

The primary outcome was a composite of death from cardiovascular causes, hospitalization for heart failure, or an urgent visit resulting in intravenous therapy for heart failure (Panel A). The cumulative incidences of the primary outcome, hospitalization for heart failure (Panel B), death from cardiovascular causes (Panel C), and death from any cause (Panel D) were estimated with the use of the Kaplan–Meier method; hazard ratios and 95% confidence intervals were estimated with the use of Cox regression models, stratified according to diabetes status, with a history of hospitalization for heart failure and treatment-group assignment as explanatory variables. Included in these analyses are all the patients who had undergone randomization. The graphs are truncated at 24 months (the point at which less than 10% of patients remained at risk). The inset in each panel shows the same data on an enlarged y axis.

Treatment Modalities

How can we improve symptoms?

- Hemodynamic interventions (diuretics, digoxin)
- Newer interventions such as resynchronization?
- Vasodilators?

How can we slow progression?

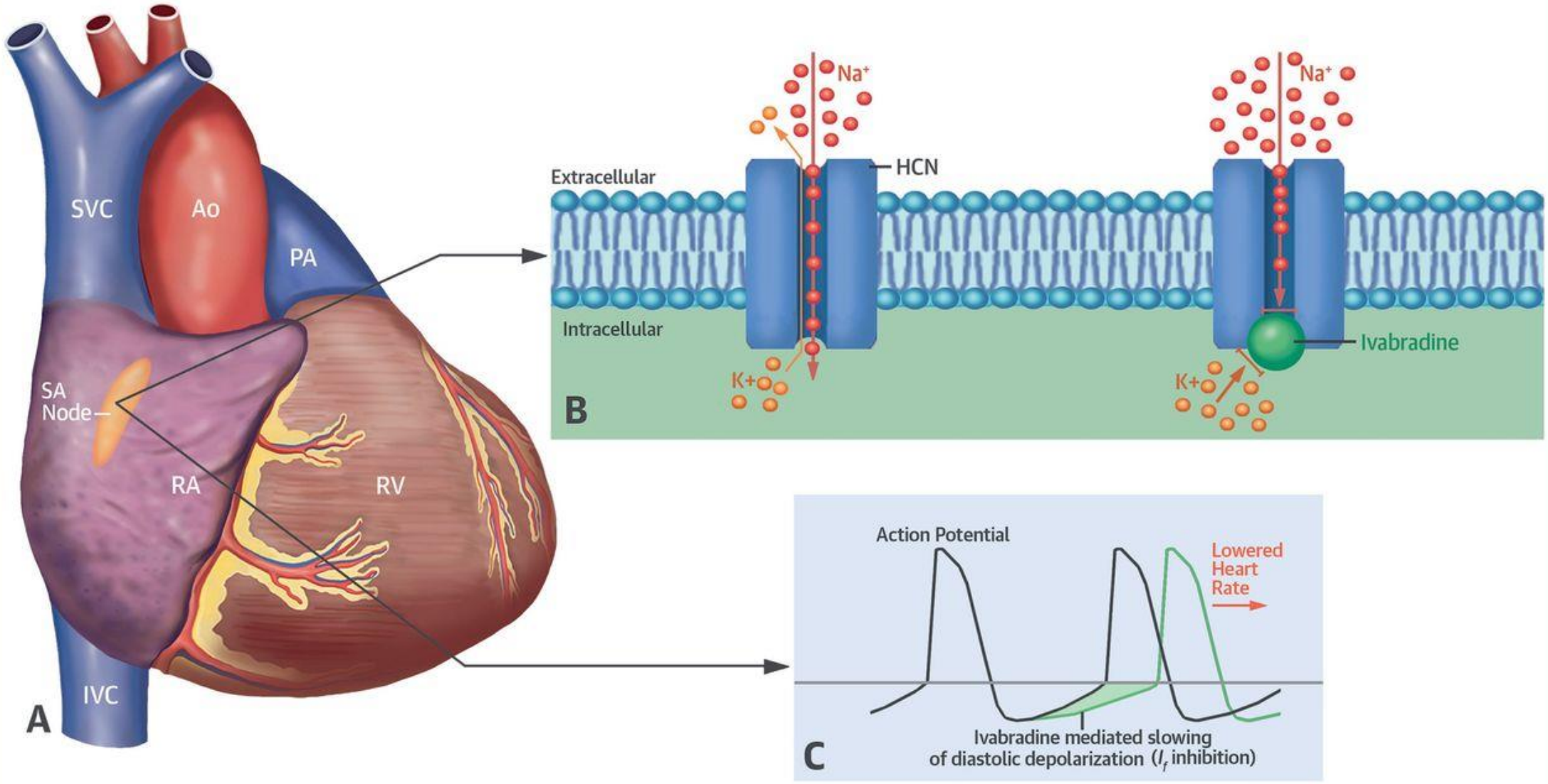
- Angiotensin axis drugs and effective β-blockers
- Neurohormonal interventions
- SGLT2 inhibitors

Ivabradine

- Ivabradine can be beneficial to **reduce HF hospitalization** for patients with symptomatic (NYHA class II-III), stable, chronic HFrEF (LVEF ≤35%) who are receiving GDMT, including a β blocker at maximally tolerated dose, and who are in **sinus rhythm with a heart rate ≥70 bpm at rest**

SHIFT ACC/AHA Guidelines 2017 update

CENTRAL ILLUSTRATION: Mechanism of Action of Ivabradine



Koruth, J.S. et al. J Am Coll Cardiol. 2017;70(14):1777-84.

Medical Therapy for Stage C HFrEF: Magnitude of Benefit in RCTs

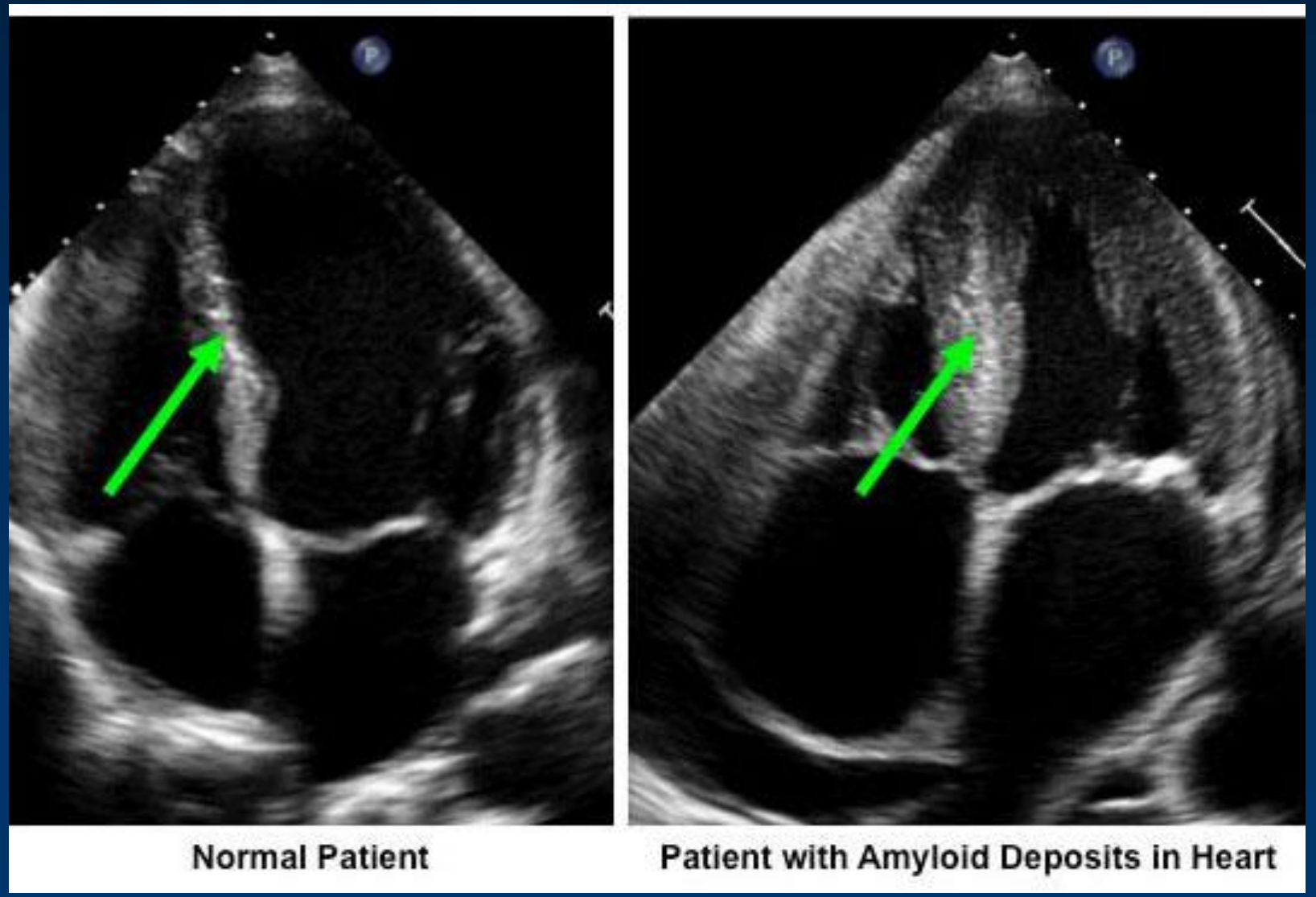
	RR ↓ Mortality	NNT to ↓ mortality (standardized 36 months)	RR ↓ HF Hospital.
ACE I / ARB	17%	26	31%
Beta-Blockers	34%	9	41%
Aldosterone Antagonists	30%	6	35%
Nitrates/Hydralazine	43%	7	33%

Cardiac Amyloidosis

- Genetic (Hereditary)
- Acquired (Wild Type Transthyretin) – Tafamidis, Patisiran, Vutrisiran (suppress aTTR synthesis)
- Malignant Light Chains (AL)
- Joint pains, biceps tendon rupture (33%), CTS (50% and precedes cardiac symptoms by 5-7 yrs)
- Screen for monoclonal light chains, and if negative, bone scintigraphy (^{99m}Tc-PYP, can identify ATTR cardiac amyloidosis with high sensitivity and specificity) should be performed to confirm the presence of transthyretin amyloid

NEJM 2025; 392:33-44

Cardiac Amyloidosis

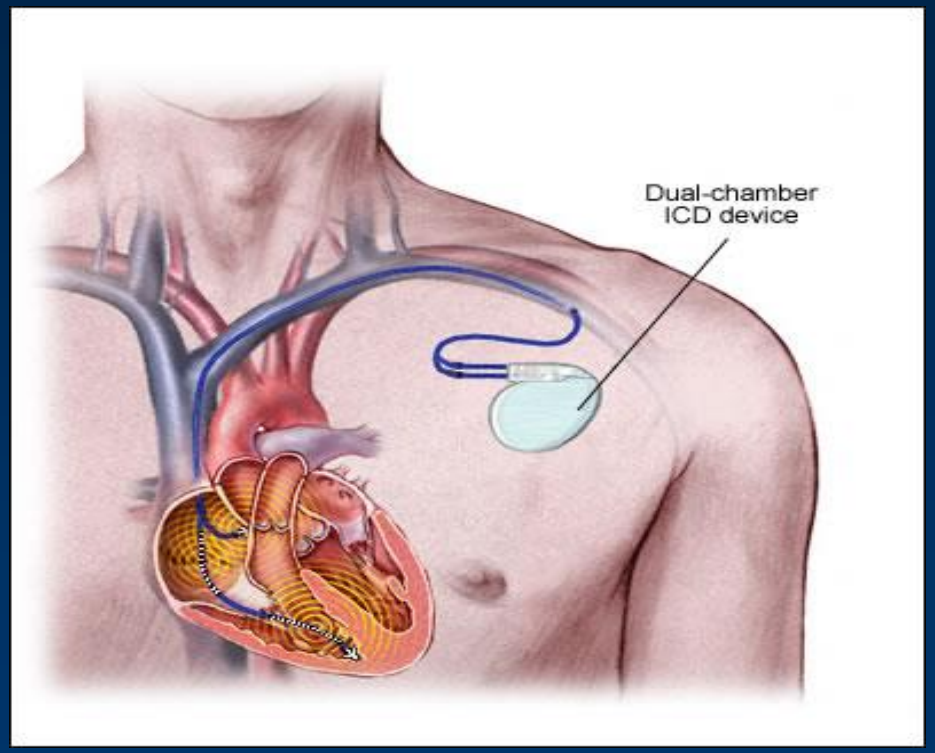


Normal Patient

Patient with Amyloid Deposits in Heart

Implantable Cardiac Defibrillators (ICD)

- Sustained ventricular tachycardia is associated with sudden cardiac death in HF.
- About one-third of mortality in HF is due to sudden cardiac death.
- ICDs for primary prevention improve survival in selected patients with HF

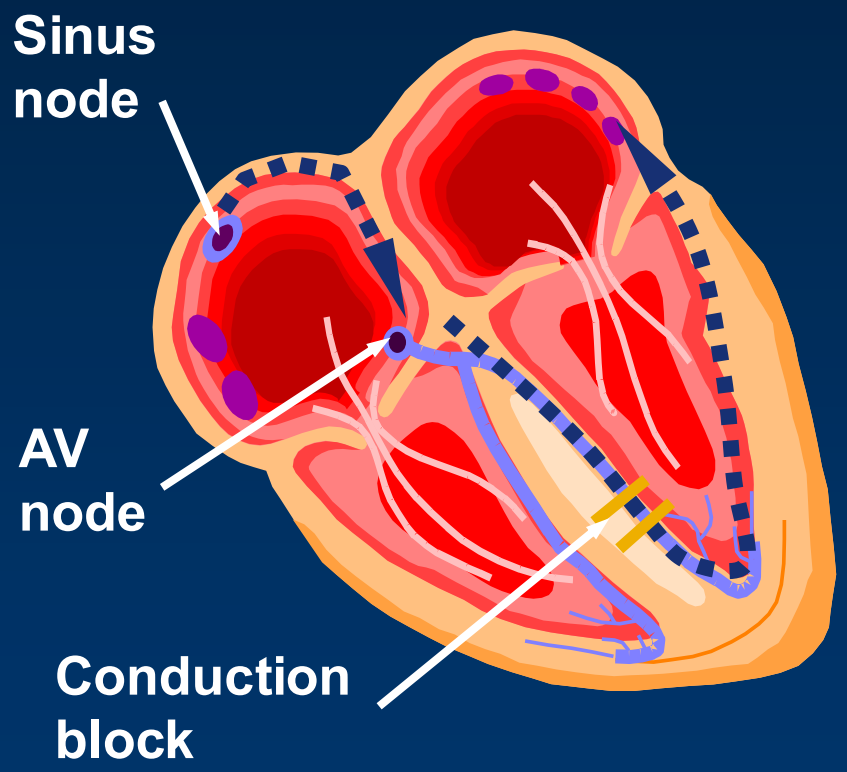


Indications for ICD Therapy

- ICD therapy is recommended for primary prevention of SCD in selected patients with HFrEF at least 40 days post-MI with LVEF ≤35%, and NYHA class II or III symptoms on chronic GDMT, who are expected to live ≥1 year
- ICD therapy is recommended for primary prevention of SCD in selected patients with HFrEF at least 40 days post-MI with LVEF ≤30%, and NYHA class I symptoms while receiving GDMT, who are expected to live ≥1 year
- ***** ICDs do not improve symptoms; most patients should be on GDMT; should have an expected life-expectancy of at least 1 year***

ACCF/AHA Guideline for the Management of Heart Failure

Cardiac Resynchronization Pacing: Consider for Consequences of a Prolonged QRS



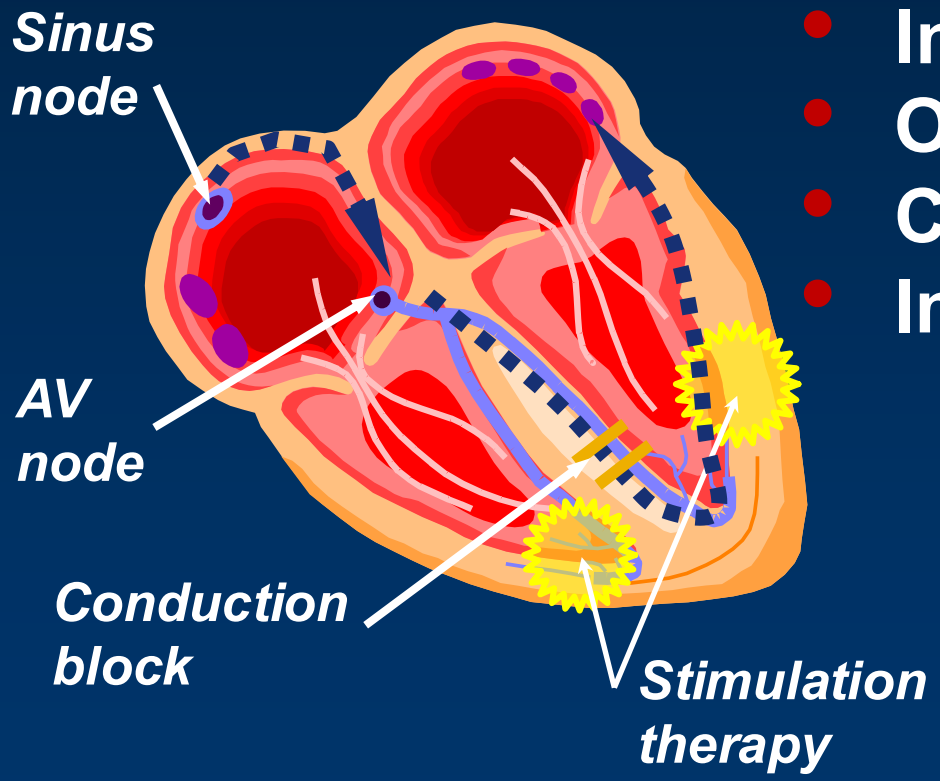
Delayed Ventricular Activation

Delayed lateral wall contraction
Disorganized ventricular contraction
Decreased pumping efficiency

Reduction in diastolic filling times

Prolongation of the duration of mitral regurgitation

Mechanism:
Ventricular Resynchronization



- Intraventricular Activation
- Organized ventricular activation sequence
- Coordinated septal and freewall contraction
- Improved pumping efficiency

Cardiac Resynchronization Rx (CRT)

- **LVEF ≤ 35%**
- **Greatest benefit in patients with symptomatic HF with LBBB + QRS ≥ 150 msec already on GDMT and in sinus rhythm**
- Can consider in patients with symptomatic HF with LBBB and QRS 120-149 msec
- Can consider in symptomatic HF with non-LBBB and QRS ≥ 150 msec
- Can be considered in atrial fibrillation if ventricular pacing is needed and rate control will allow nearly 100% ventricular pacing with CRT

Valuation of interventions

- High value therapies (<$60,000/quality-adjusted life year gained)
  - ARNi, ACEi, ARB, beta blocker, MRA, hydralazine and isosorbide dinitrate in African Americans
  - implantable cardioverter-defibrillator (ICD)
  - cardiac resynchronization therapy (CRT) value.
- Intermediate Value ($60,000 to 180,000/quality-adjusted life year gained
  - SGLT2i and cardiac transplantation
- Low Value (>$180,000/quality-adjusted life year gained)
  - Tafamidis for amyloid
- Uncertain Value
  - mechanical circulatory support and pulmonary pressure monitoring are of uncertain

Stage D
Refractory HF
Marked HF symptoms at rest
Recurrent hospitalizations despite GDMT

THERAPY

Goals
- Control symptoms
- Improve HRQOL
- Reduce hospital readmissions
- Establish patient's end-of-life goals

Options
- Advanced care measures
- Heart transplant
- Chronic inotropes
- Temporary or permanent MCS
- Experimental surgery or drugs
- Palliative care and hospice
- ICD deactivation

End-of-Life Care in Heart Failure

End-of-life care *should be considered* in patients who have advanced, persistent HF with symptoms at rest despite repeated attempts to optimize pharmacologic, device, and other therapies, as evidenced by one or more of the following:

HF hospitalization ***Strength of Evidence = C***

Chronic poor quality of life with inability to accomplish activities of daily living ***Strength of Evidence = C***

Need for continuous IV inotropic therapy support ***Strength of Evidence = C***

Lindenfeld J, et al. HFSA 2010 Comprehensive Heart Failure Guideline. J Card Fail 2010;16e1-e194.

Let’s test our knowledge…..

Time for a Case

Case – Carol 68 y.o. F new patient

- (CC): “I am having problems with leg swelling.”
- (HPI)The swelling has gradually worsened but is markedly worse over the past 2 days. She is concerned that the swelling is not improving despite trying to elevate her legs in a reclining chair in the evening. Swelling is better in the morning, worse in the evening with tightness noted as the only pain.

- ROS: negative for chest pain. Positive for exertional dyspnea and nighttime orthopnea for the past week, and some wheezing.

- PMH
  - Hypertension
  - Back pain
  - Elevated cholesterol
  - Borderline diabetes

- Meds:
  - Amlodipine 5 mg PO daily
  - Celecoxib 100 mg PO twice a day
  - HCTZ 12.5 mg PO daily
  - Rosuvastatin 5 mg PO daily
- No medication allergies
- Prior surgical history:

  No prior surgeries
- Social History:
  - 1 glass of wine daily
  - 1 ppd cigarettes for 50 years
  - Rare book store owner/operator who travels extensively

Reasoning:

What are the possible causes of her presentation?

Differential diagnosis?

What information do you want before proceeding to the exam?

What are the physical exam findings you are going to seek?

Carol - Physical Examination

BP: 115 / 90; P: 106 regular; R: 20

Weight:	230 # ; BMI: 36.0; Height: 67”
Neck:	2+ carotids. Unable to assess JVD
Lungs:	Rales 1/3 of the way up post lung fields
Heart:	RRR nlS1+ S2, S3 present
Abdomen:	BS+, protuberant, No fluid wave demonstrable, No hepatojugular reflux
Back:	No palpable tenderness or spasm.
O_2 sat:	93%

Extremities:

UE's: normal

LE's: palpable but decreased distal pulses; bilateral R>L hyper pigmentation noted

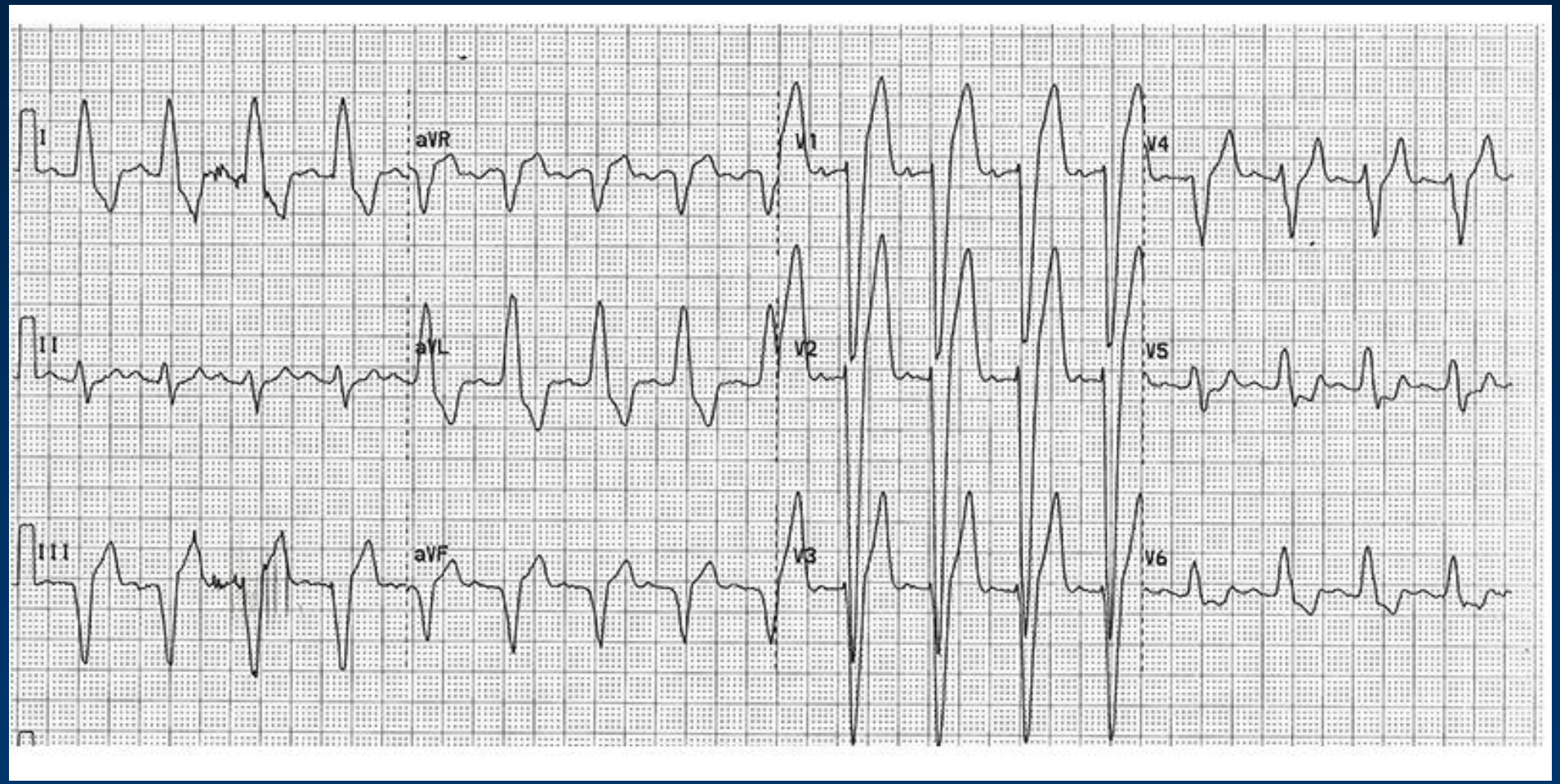
calf circumferences; R=51cm L=49cm

Pitting edema noted to the proximal tibia

What tests would you like to order?

Why?

Carol's EKG



R
L

Carol - Labs

UA:	no protein
Hct:	33%
Hgb:	10.8
Na:	137
K:	3.7
BUN:	46
Creat:	1.9

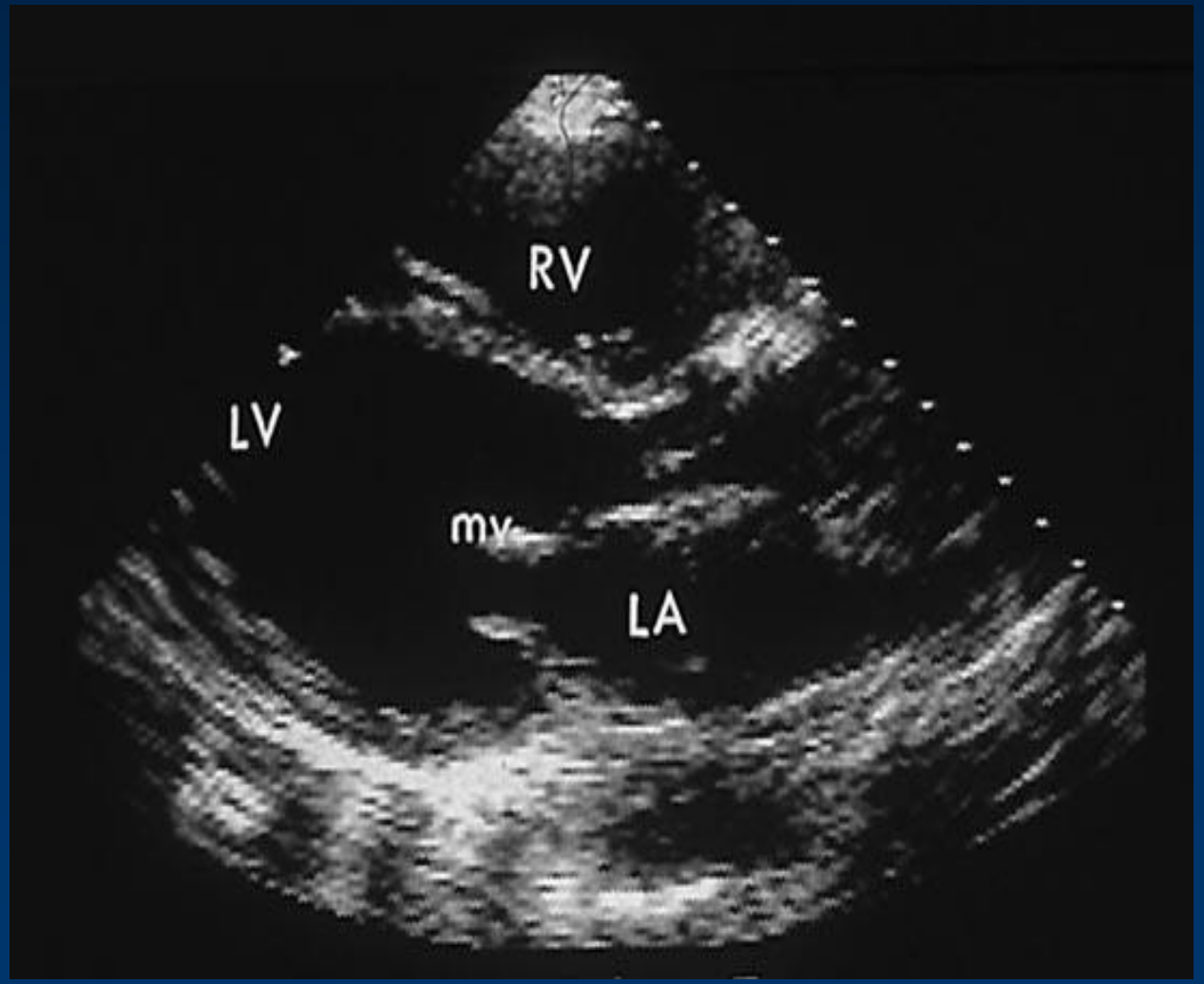
Alb	3.3
ALP	149 (nl 100 - 130)
AST	47 (nl 28 - 42)
ALT	49 (nl 34 - 47)
Troponin I	3.8 (nl <0.4)

Labs

BNP: 1680

EF: 30%

Echo



Which Heart Failure Stage would you place this patient in, based on your understanding of the case?

A. Stage A

B. Stage B

C. Stage C

D. Stage D

Which of the following is the most accurate description of the patient's condition?

A. HFpEF

B. HFrEF

C. Restrictive Cardiomyopathy

D. Pericardial Disease

Summary

- Definition of HF
- Magnitude of the problem
- Symptoms & Signs of HF
- Types of HF: HFpEF, HFrEF and…
- Stages and NYHA Functional Classification of HF
- Management of Patients with HF
- Heart Failure…An Example of Medical Advances in One Career

INTERNAL MEDICINE FOR PRIMARY CARE:
DERMATOLOGY/GERIATRICS/GYNECOLOGY/RHEUMATOLOGY

Heart Failure in Older Adults

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