The 4th Indonesian Symposium on Heart Failure and Cardiometabolic Disease

Heart Failure Horizons: Pioneering Prevention Strategies for Tomorrow Cardiology

Erwinanto MD

Heart Failure and Cardiometabolic Disease Working Group

The Indonesia Heart Association

Universal definition of heart failure

Universal definition and classification of heart failure: a report of the Heart Failure Society of America, Heart Failure Association of the European Society of Cardiology, Japanese Heart Failure Society and Writing Committee of the Universal Definition of Heart Failure

Endorsed by the Canadian Heart Failure Society, Heart Failure Association of India, Cardiac Society of Australia and New Zealand, and Chinese Heart Failure Association

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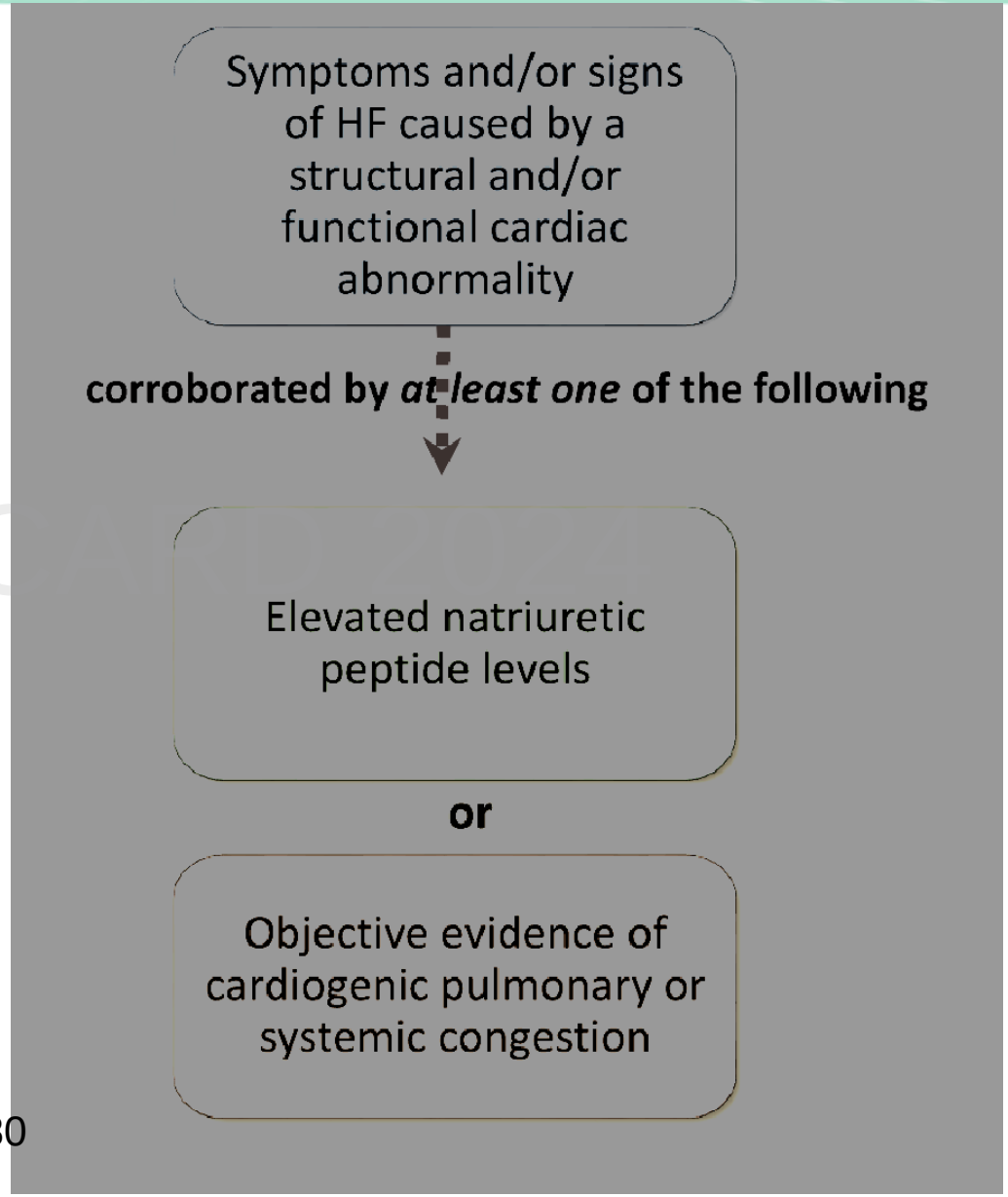
Eur J Heart Fail 2021;23:352–380

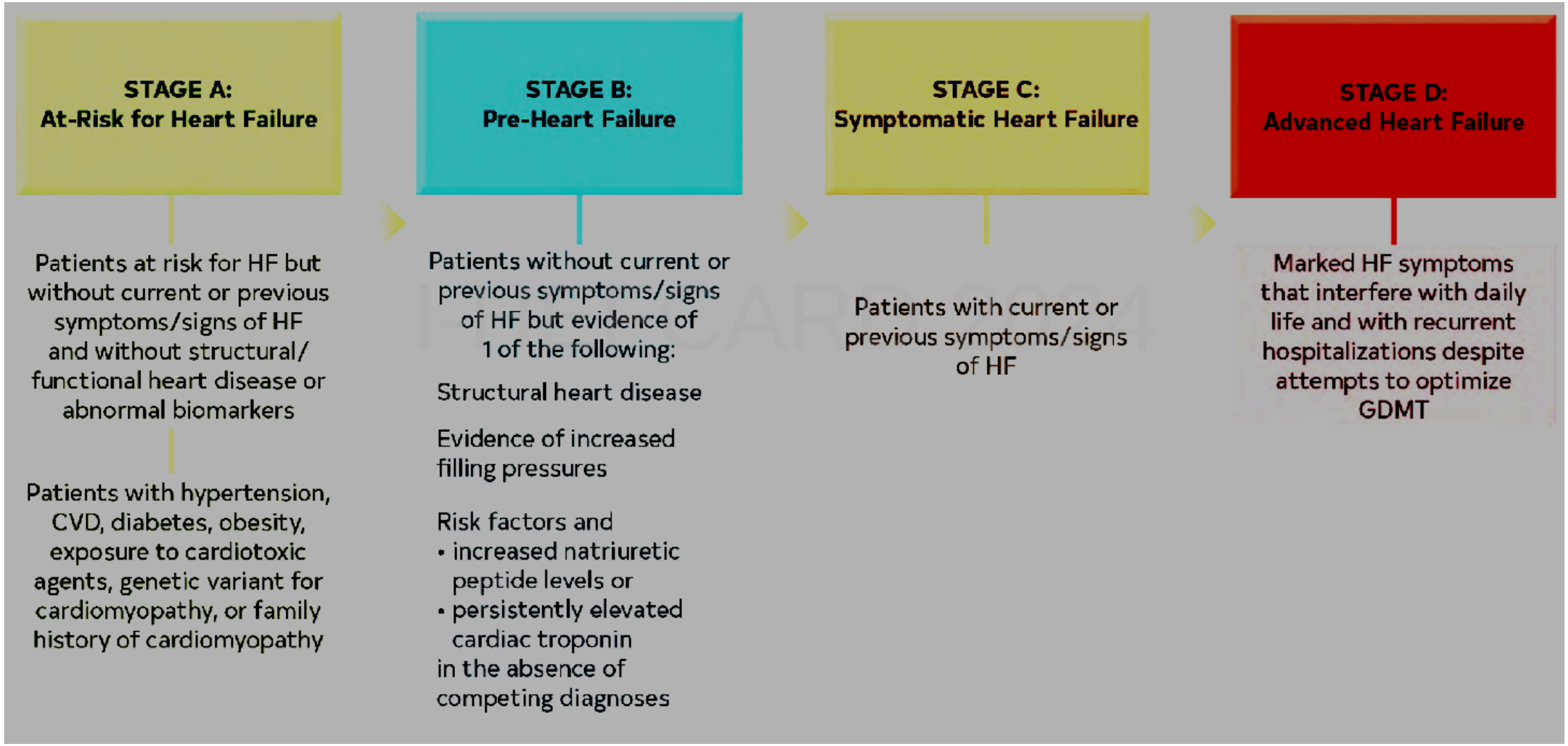
Universal definition of heart failure



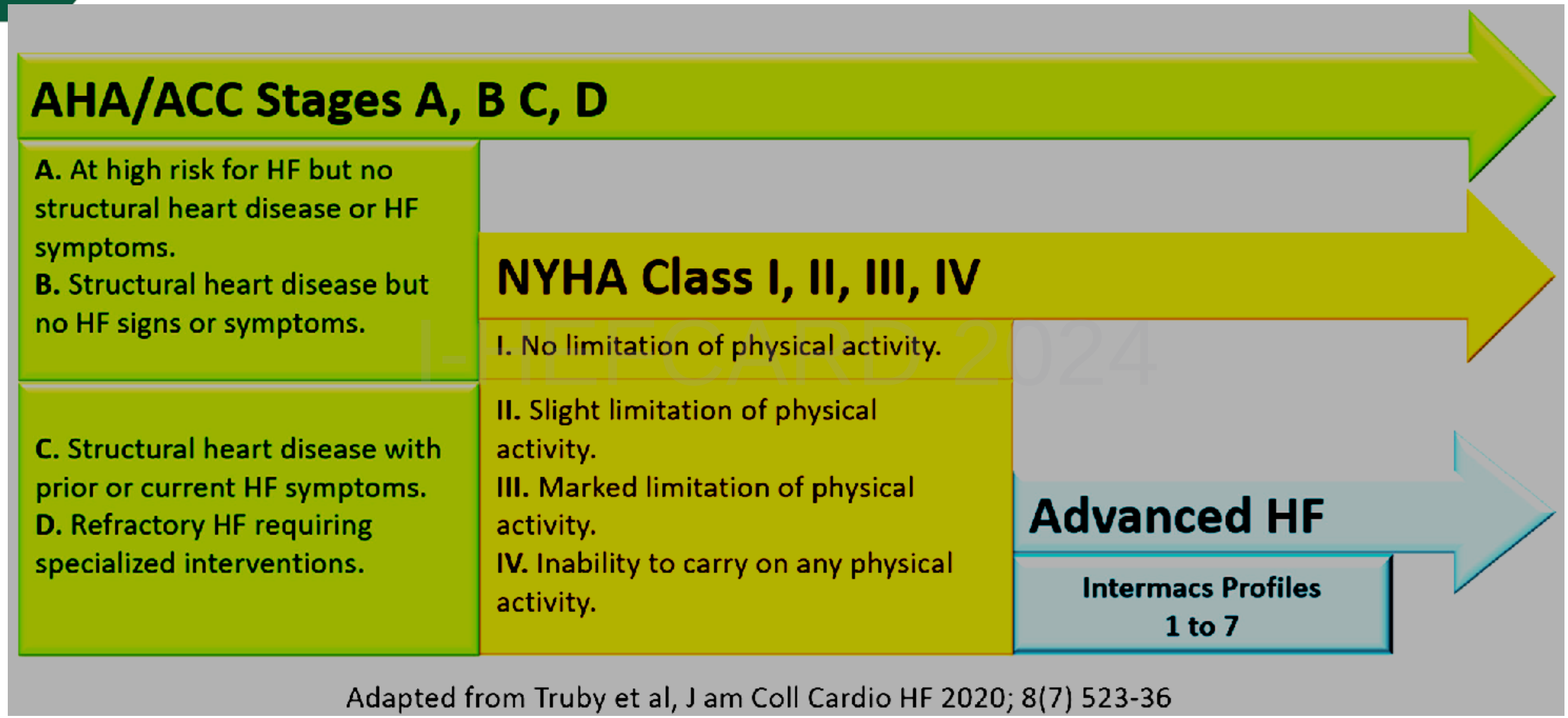
Bozkurt B, et al. Eur J Heart Failure 2021;23:352–380

Scope of heart failure prevention

ACC/AHA Stages of HF



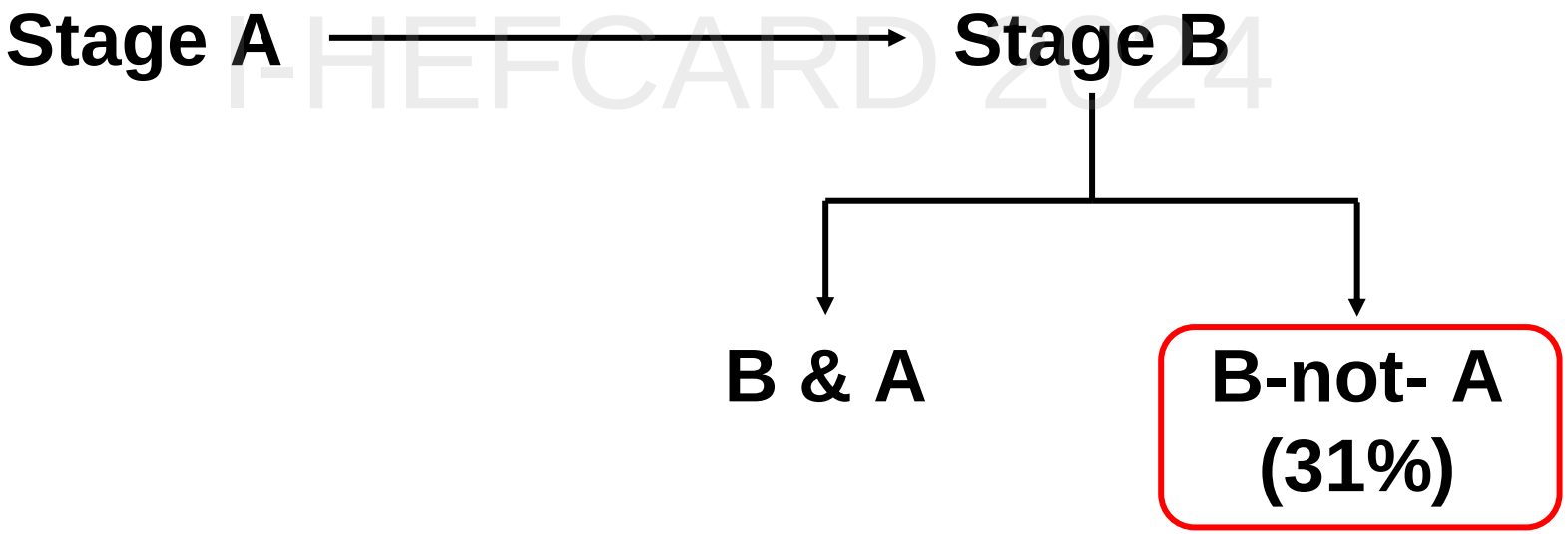
Heidenreich PA, et al. Circulation. 2022;145:e895–e1032



Adapted from Truby et al, J am Coll Cardio HF 2020; 8(7) 523-36

Roger VL. Circulation Research. 2021;128:1421–1434

Prevalence and determinants of the precursor stages of heart failure: results from the population-based STAAB cohort study



Morbach C, et al. Eur J Preventive Cardiol 2021;28:924-934

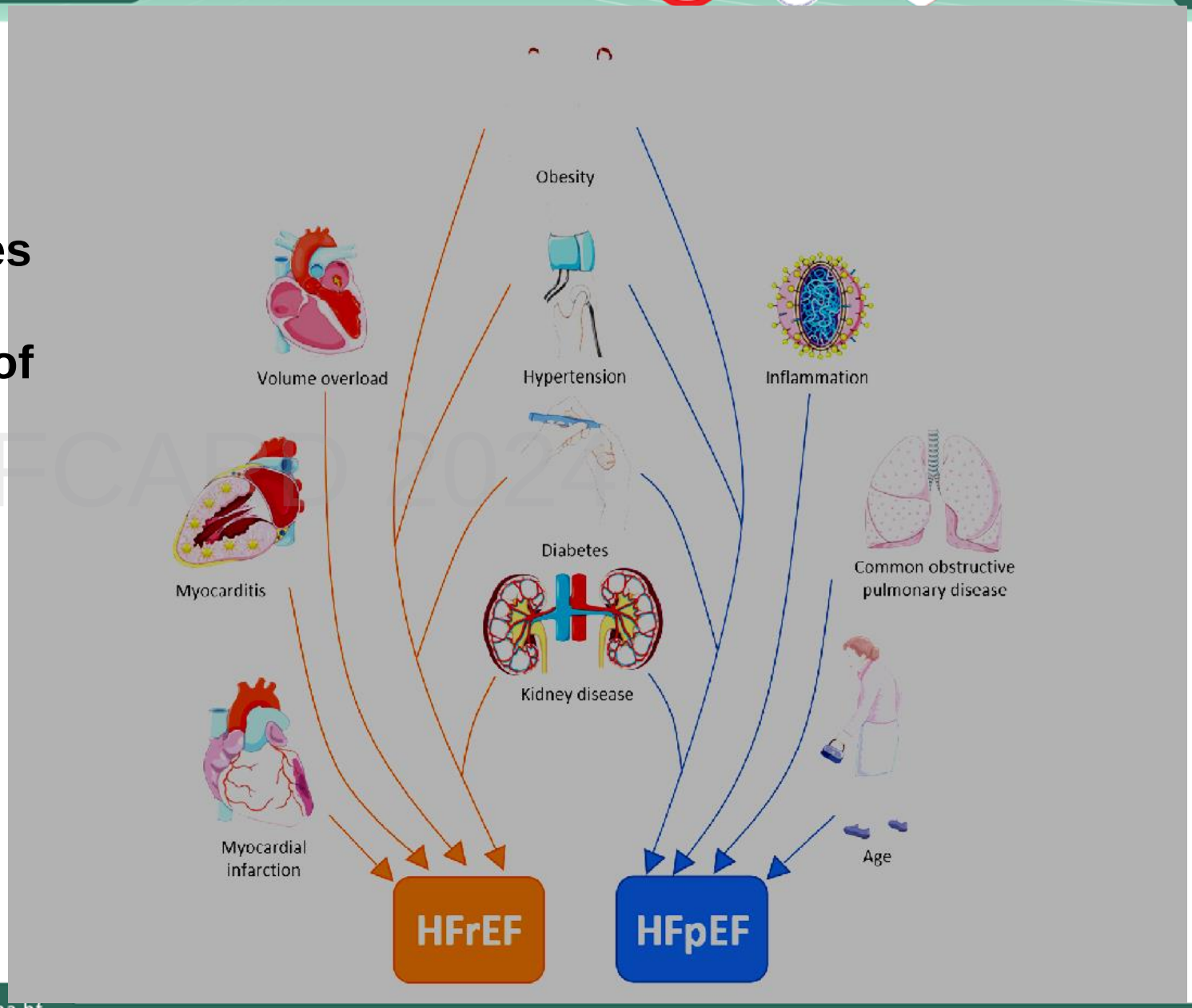
Natural History of Asymptomatic Left Ventricular Systolic Dysfunction in the Community

Thomas J. Wang, MD; Jane C. Evans, DSc; Emelia J. Benjamin, MD, ScM; Daniel Levy, MD; Elizabeth C. LeRoy, BS; Ramachandran S. Vasan, MD

Some asymptomatic LV dysfunction (LVEF ≤50%) subjects died of cardiovascular causes without passing through a symptomatic phase of CHF.

Circulation. 2003;108:977-982

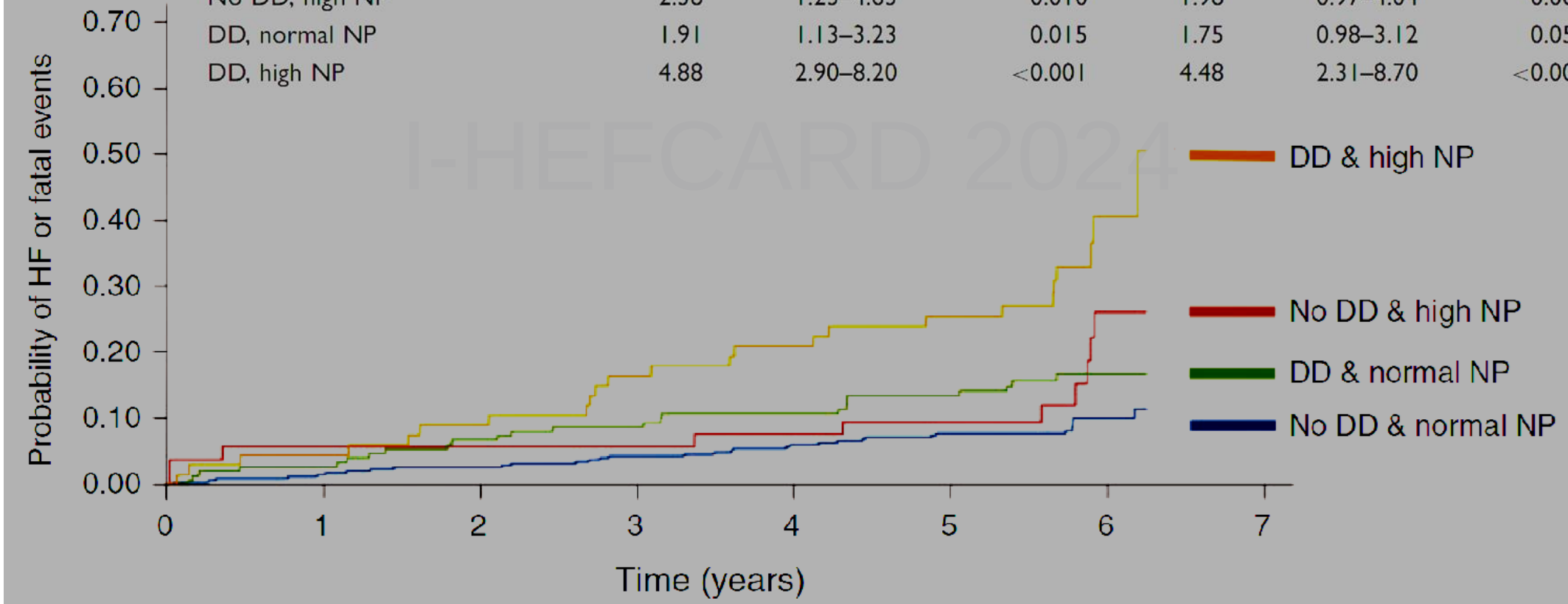
Risk factors and comorbidities involved in the development of HFrEF and HFpEF



Simmonds SJ, et al. Cells 2020;9:242

Integrating natriuretic peptides and diastolic dysfunction to predict adverse events in high-risk asymptomatic subjects

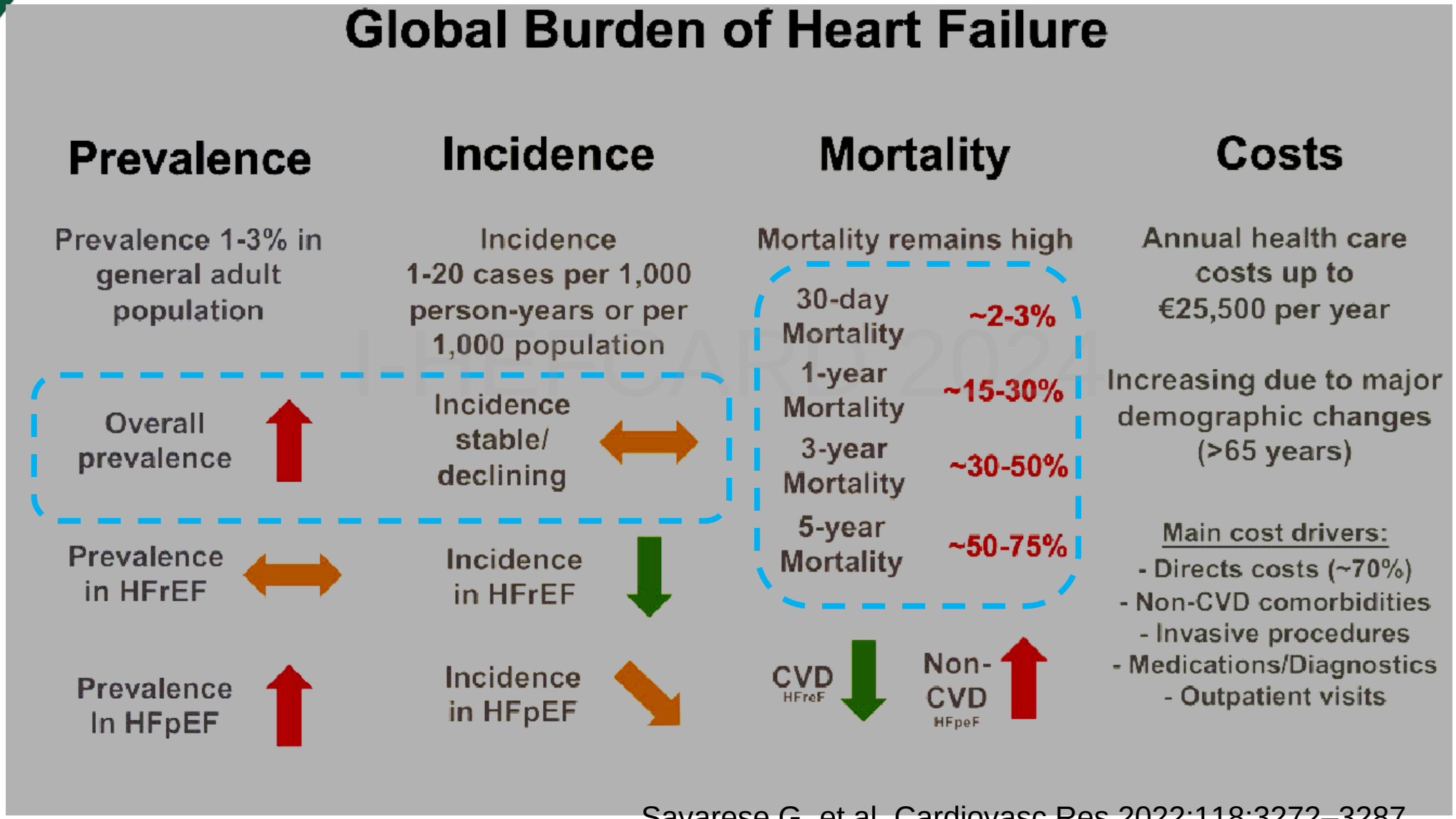
Control group (no DD, normal NP)	1.00	(Reference)				
No DD, high NP	2.38	1.23–4.63	0.010	1.98	0.97–4.04	0.060
DD, normal NP	1.91	1.13–3.23	0.015	1.75	0.98–3.12	0.057
DD, high NP	4.88	2.90–8.20	<0.001	4.48	2.31–8.70	<0.001



Gori M, et al. Eur J Preventive Cardiology 2021;28:937–945

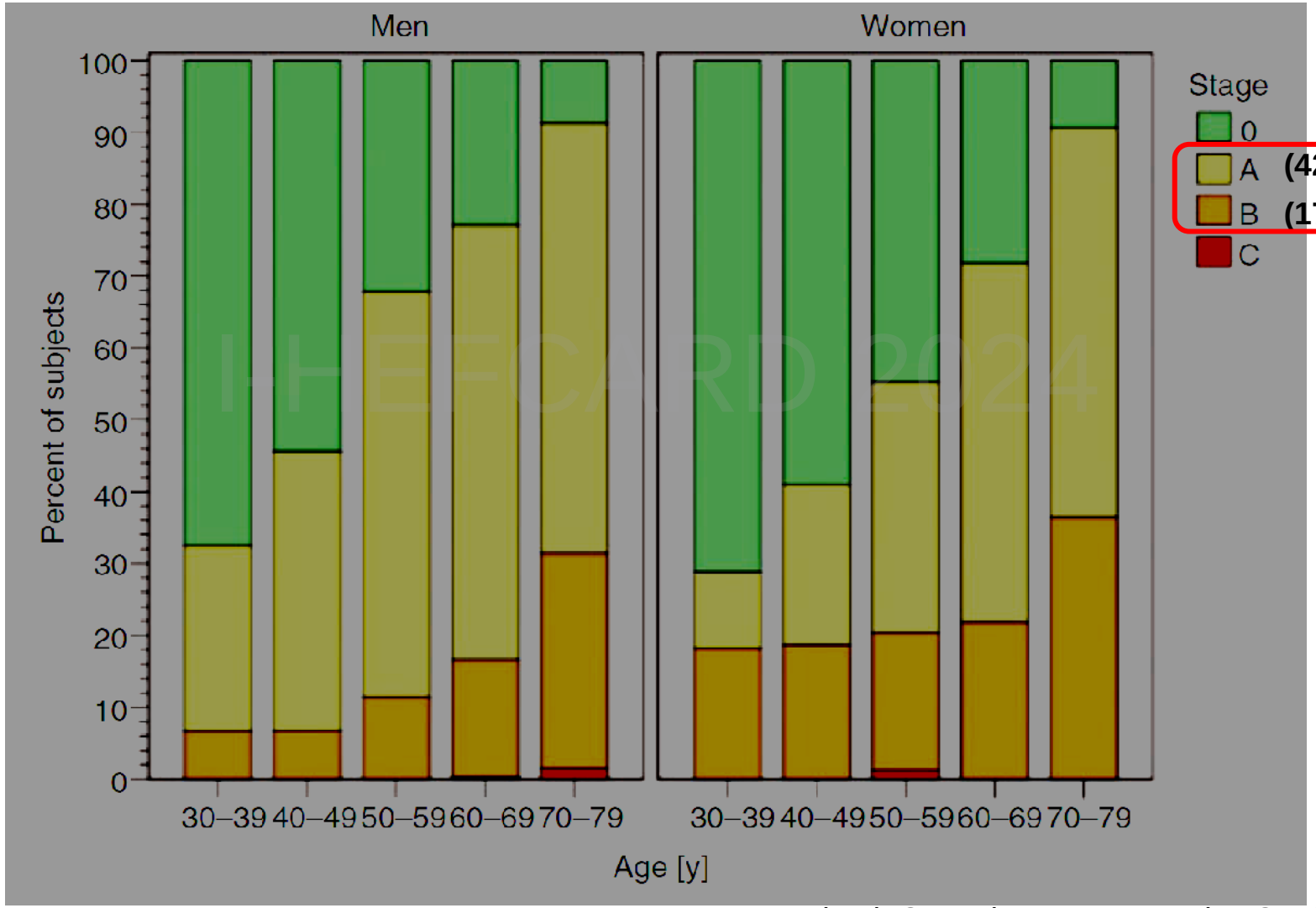
Heart failure prevention deserves high priority

Global Burden of Heart Failure



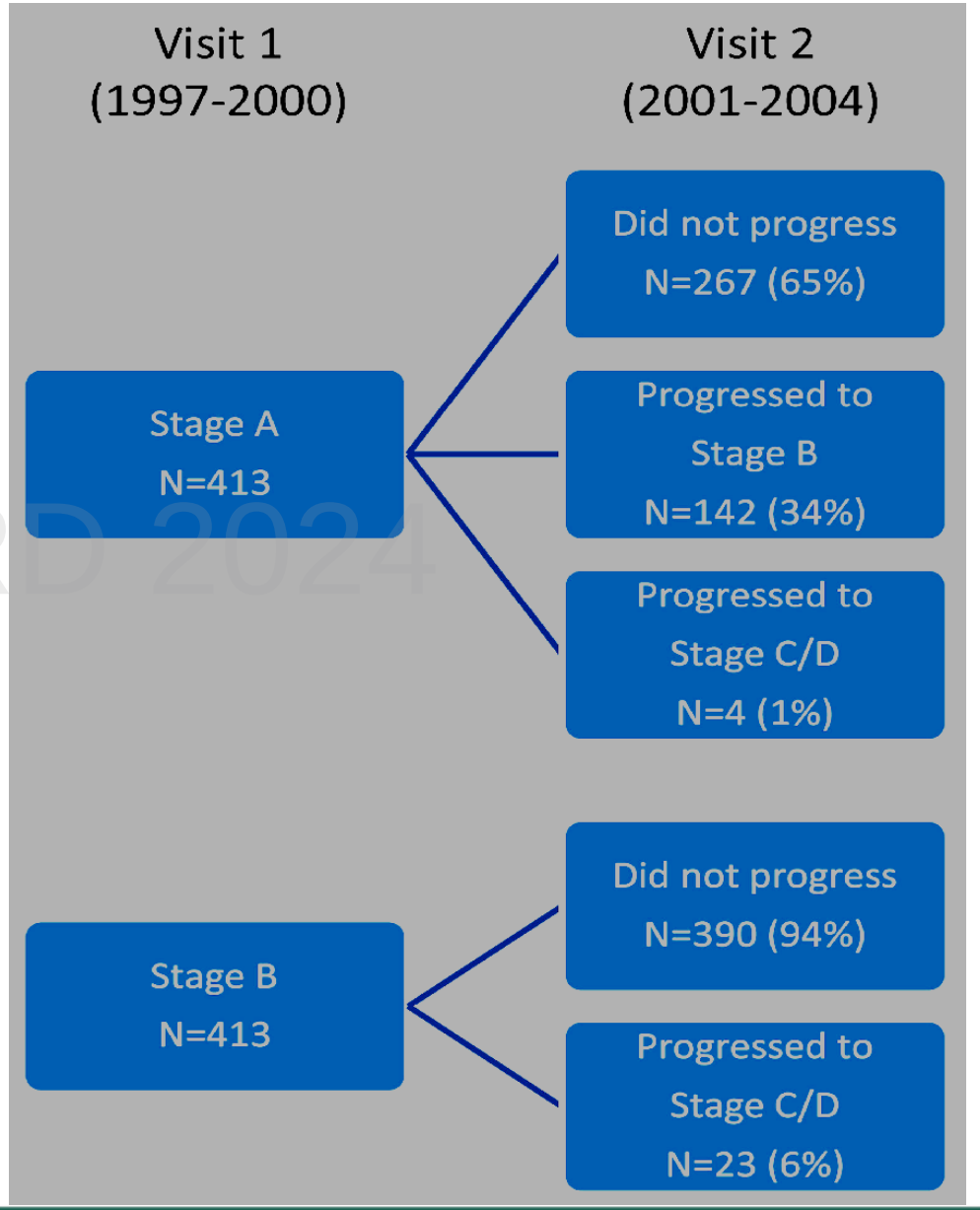
Savarese G, et al. Cardiovasc Res 2022;118:3272–3287

Crude distribution of heart failure stages 0, A, B, and C in men and women, by age decades



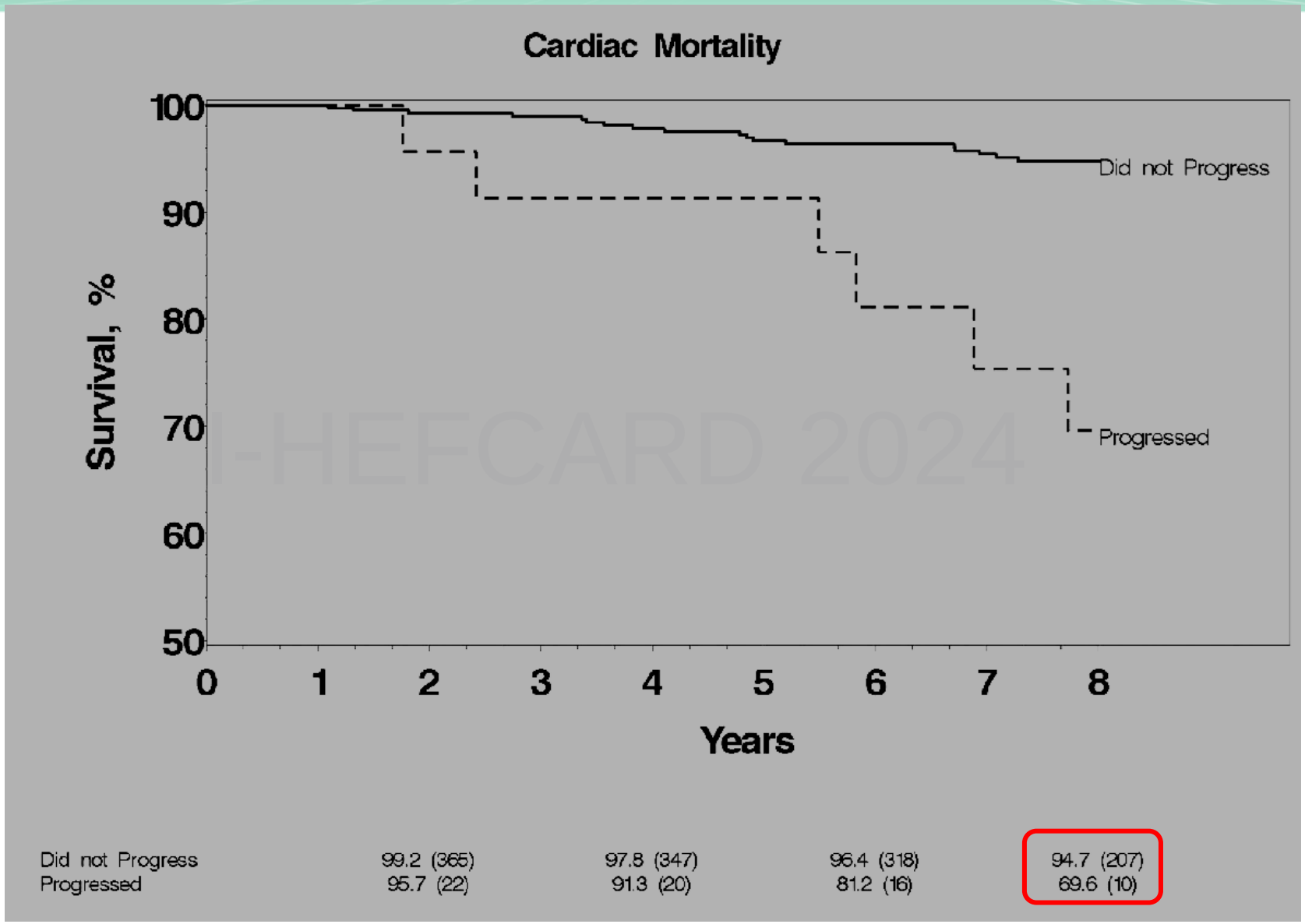
Morbach C, et al. Eur J Preventive Cardiol 2021;28:924-934

Progression in Heart Failure Stage



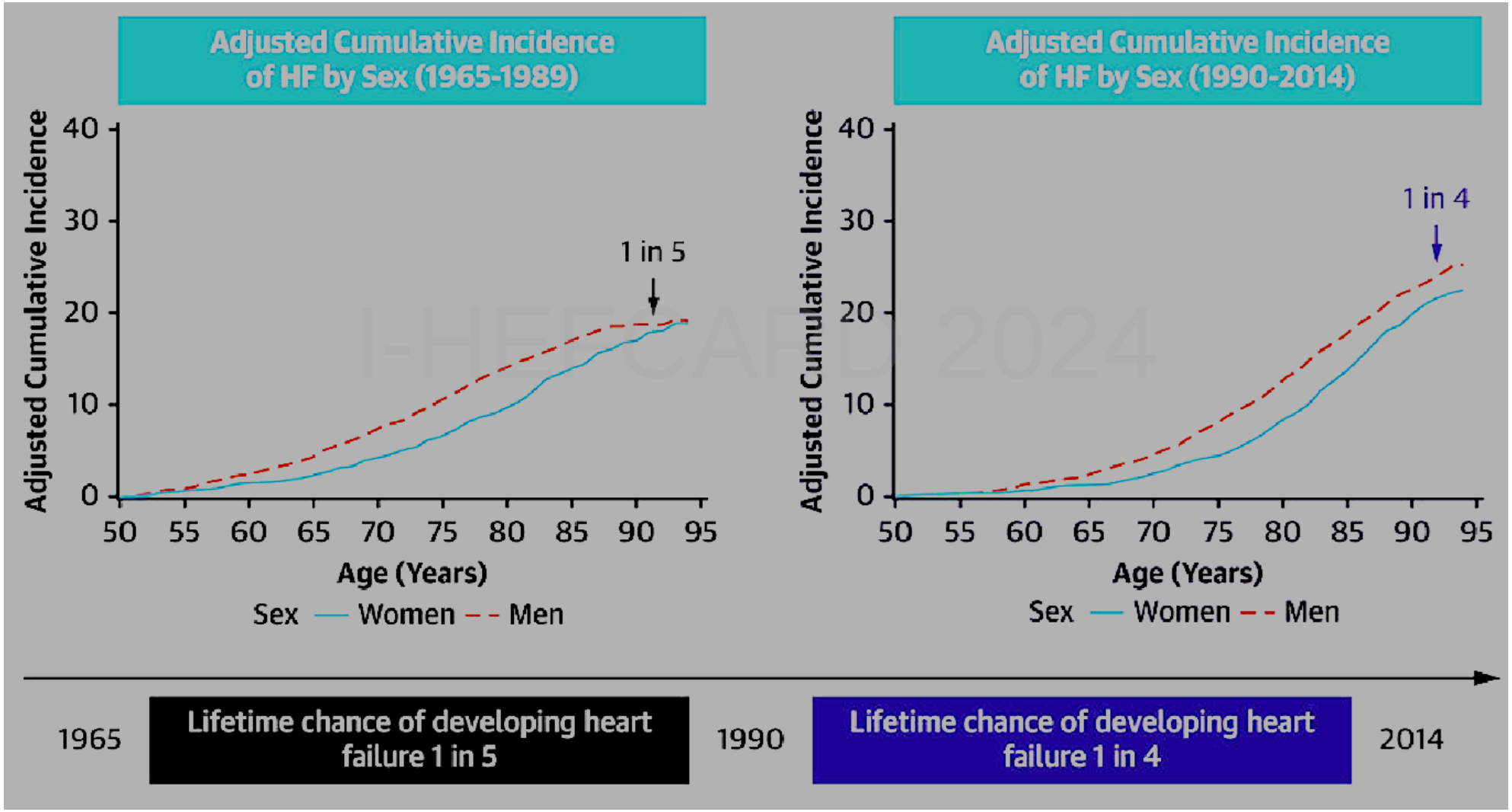
Young KA, et al.

Circ Cardiovasc Qual Outcomes. 2021;14(5): e007216



Young KA, et al. Circ Cardiovasc Qual Outcomes. 2021;14(5): e007216

Change in lifetime risk of heart failure



Vasan RS, et al. Am Coll Cardiol. 2022;79:250–263

Cumulative incidence of HFpEF versus HFrEF at age 50 according to risk factor strata

		Adjusted Cumulative incidence, % (95% CI) for HFpEF			Adjusted Cumulative incidence, % (95% CI) for HFrEF			RLR Rate ratio HFrEF vs. HFpEF, P
		30-year	40-year	Lifetime (RLR)	30-year	40-year	Lifetime (RLR)	
Overall	N/Pyr	122/109839	282/125946	338/128634	210/109883	393/126001	429/128680	
	ACI	3.12 (2.57-3.67)	7.57 (6.72-8.42)	**9.26** (8.32-10.21)	5.27 (4.57-5.96)	10.34 (9.37-11.31)	**11.43** (10.41-12.45)	1.23 p=0.002

RLR; residual lifetime risk

Vasan RS, et al. Am Coll Cardiol. 2022;79:250–263

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

Areas of focus include:

- Prevention of HF.
- Management strategies in stage C HF, including:
  - New treatment strategies in HF, including sodium-glucose cotransporter-2 inhibitors (SGLT2i) and angiotensin receptor-neprilysin inhibitors (ARNi).
  - Management of HF and atrial fibrillation (AF), including ablation of AF.
  - Management of HF and secondary MR, including MV transcatheter edge-to-edge repair.
- Specific management strategies, including:
  - Cardiac amyloidosis.
  - Cardio-oncology.
- Implantable devices.
- Left ventricular assist device (LVAD) use in stage D HF.

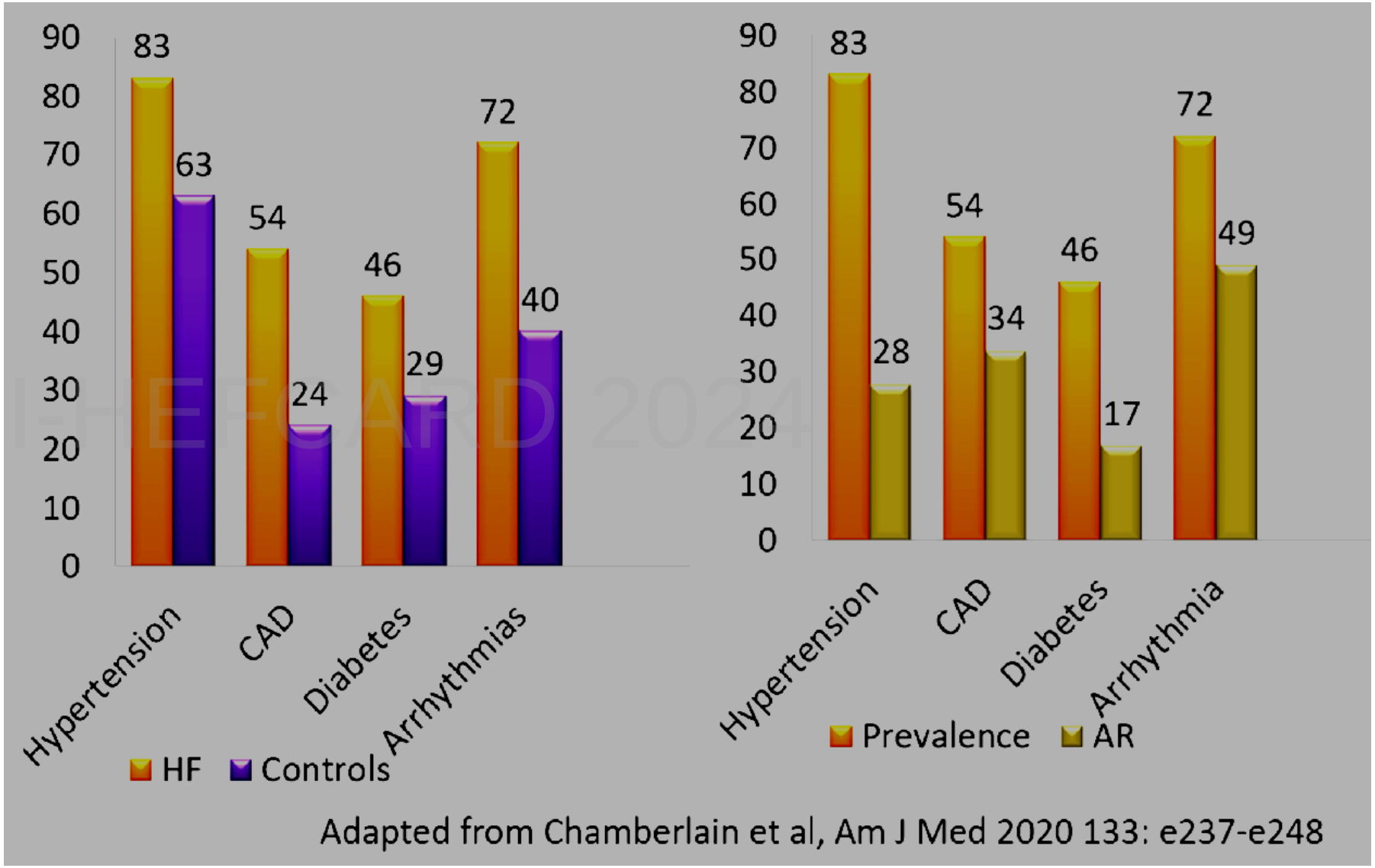
2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

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

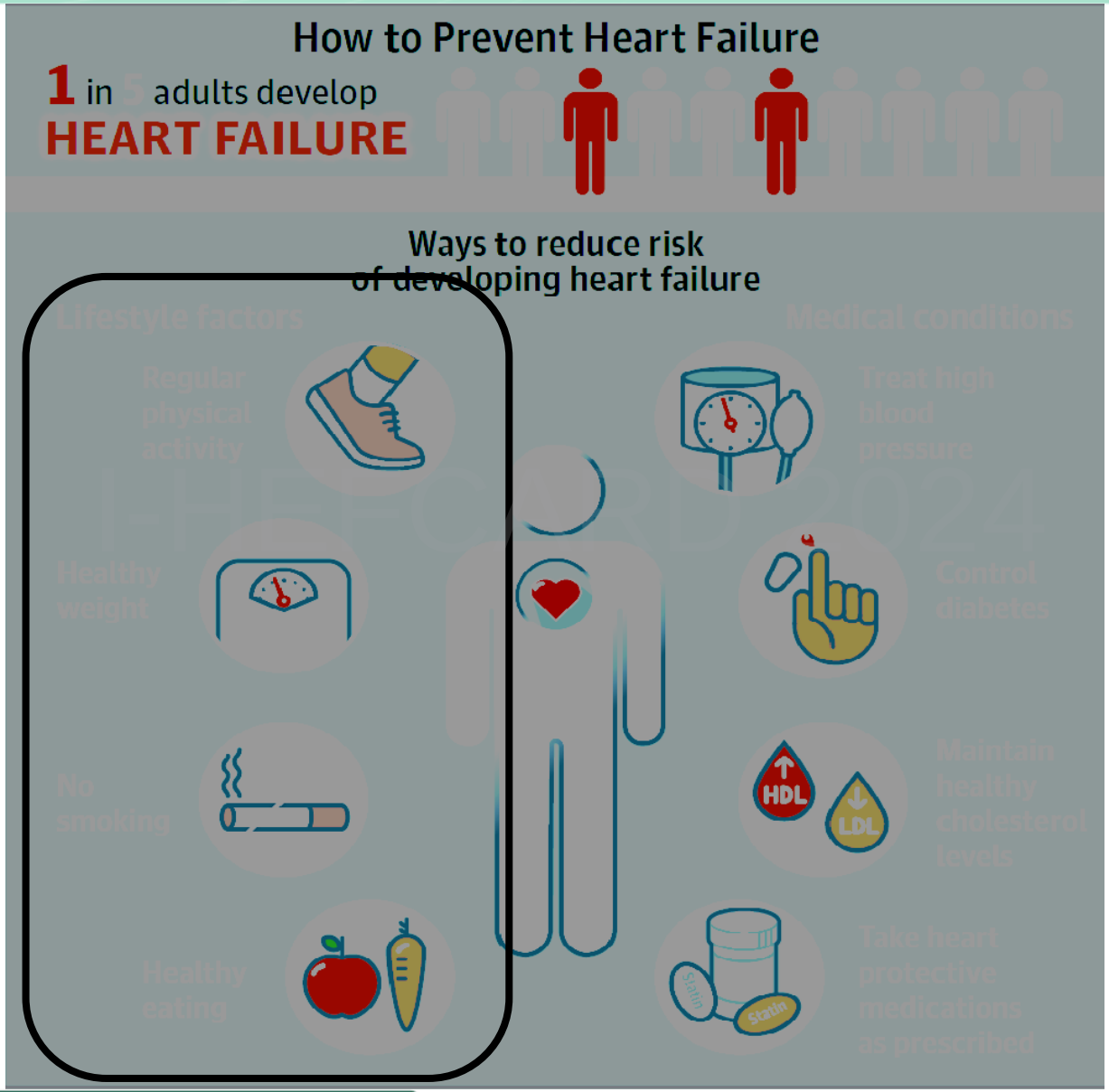
In this guideline, we have decided to focus on the diagnosis and treatment of HF, not on its prevention. Management of CV risk and many CV diseases [especially systemic hypertension, diabetes mellitus, coronary artery disease, myocardial infarction (MI), atrial fibrillation (AF), and asymptomatic left ventricular (LV) systolic dysfunction] will reduce the risk of developing HF, which is addressed by many other ESC Guidelines and in section 9.1 of the current guideline.[2–7]

Prevention from developing stage A heart failure

Prevalence and attributable risk (AR) of comorbidities in heart failure



Roger VL. Circulation Research. 2021;128:1421–1434



Horwich TB, Fonarow GC.

JAMA Cardiology 2017;2:116

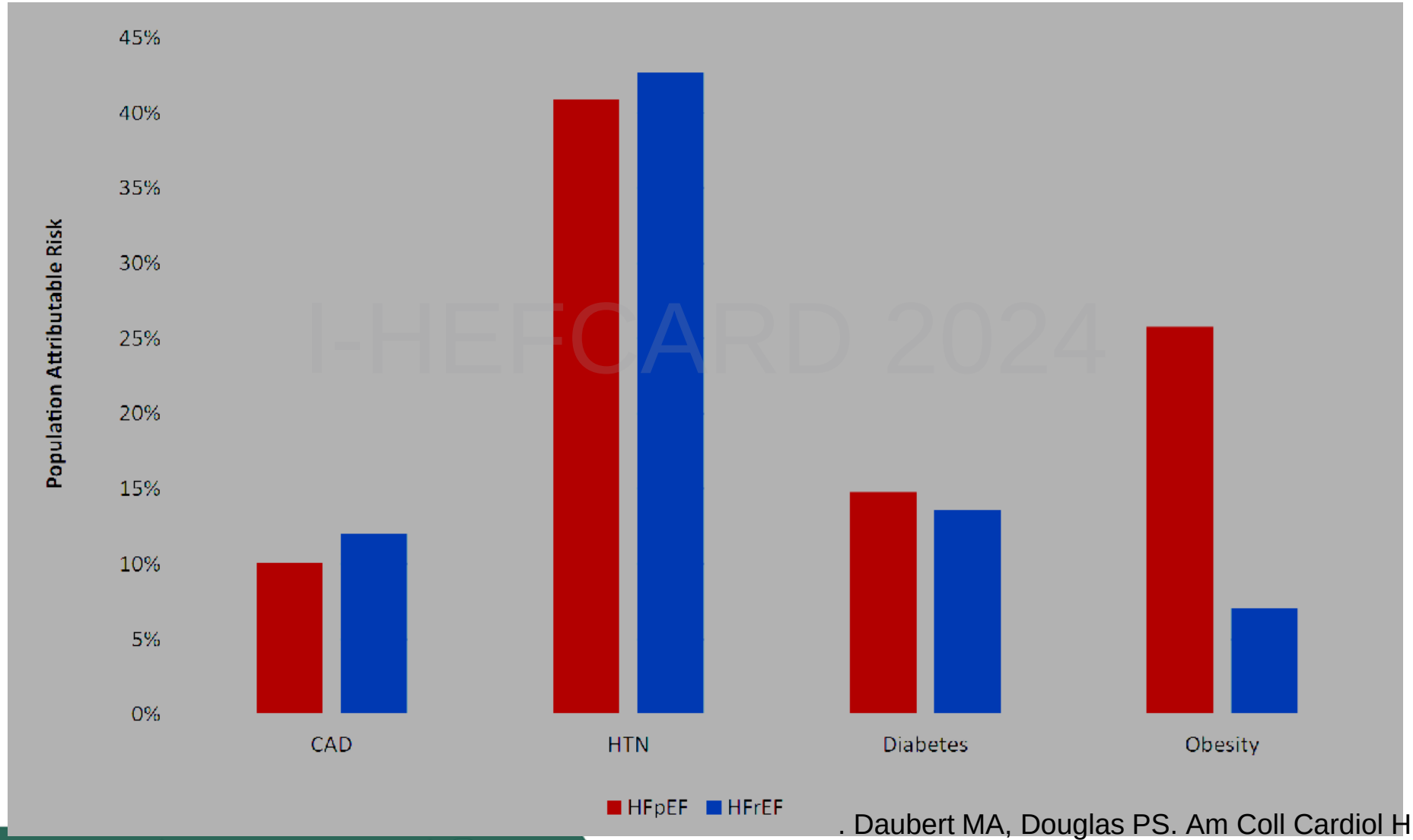
Prevention from developing stage B heart failure

Risk factors for heart failure	Preventive strategies
Sedentary habit	Regular physical activity
Cigarette smoking	Cigarette smoking cessation
Obesity	Physical activity and healthy diet
Excessive alcohol intake[286]	General population: no/light alcohol intake is beneficial Patients with alcohol-induced CMP should abstain from alcohol
Influenza	Influenza vaccination
Microbes (e.g. *Trypanosoma cruzi*, Streptococci)	Early diagnosis, specific antimicrobial therapy for either prevention and/or treatment
Cardiotoxic drugs (e.g., anthracyclines)	Cardiac function and side effect monitoring, dose adaptation, change of chemotherapy
Chest radiation	Cardiac function and side effect monitoring, dose adaptation
Hypertension	Lifestyle changes, antihypertensive therapy
Dyslipidaemia	Healthy diet, statins
Diabetes mellitus	Physical activity and healthy diet, SGLT2 inhibitors
CAD	Lifestyle changes, statin therapy

McDonagh TA, Metra M, et al.

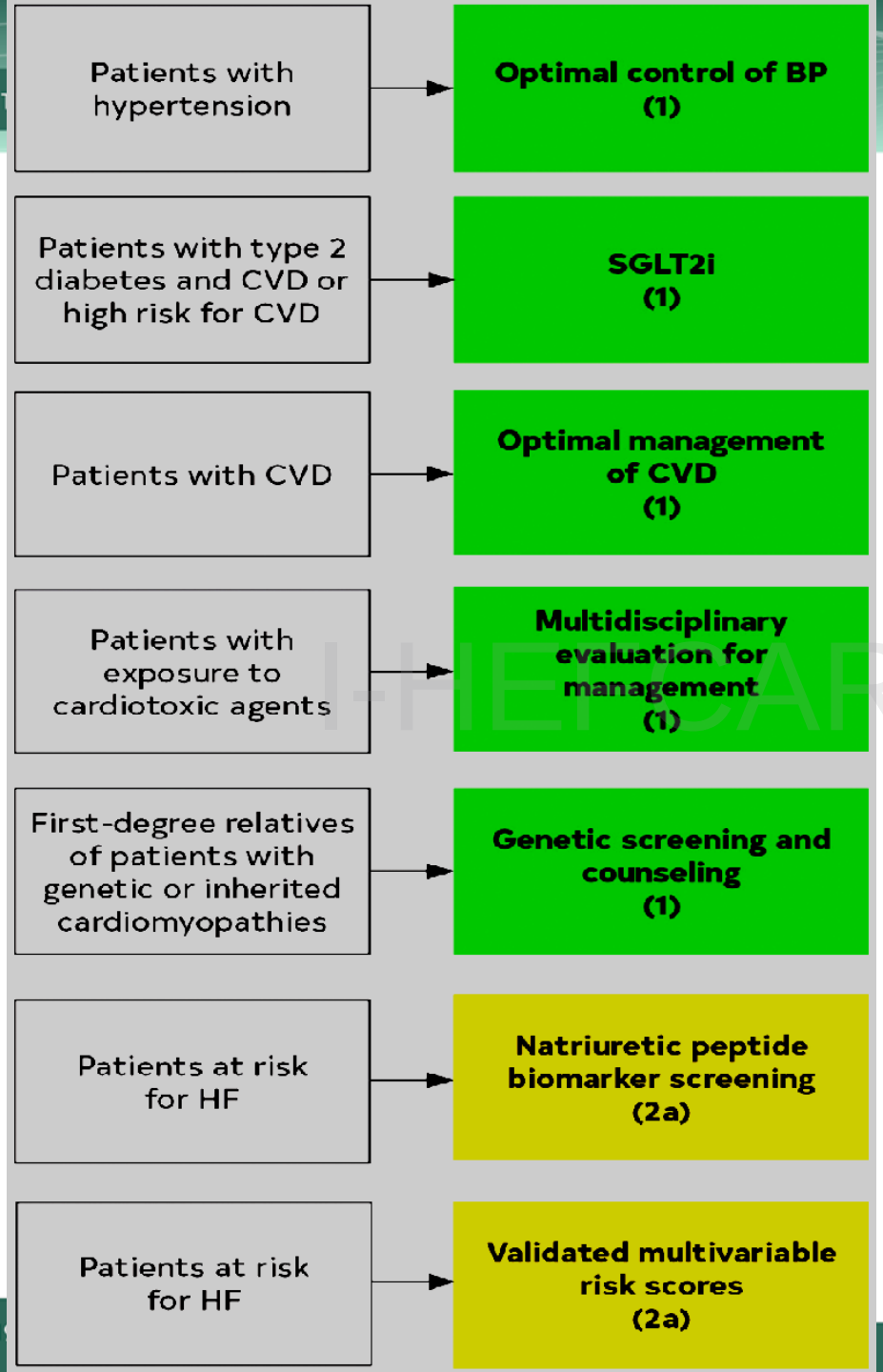
Eur Heart J 2021;00:1-128

Population attributable risk of comorbidities for HFpEF and HFrEF in women



. Daubert MA, Douglas PS. Am Coll Cardiol HF 2019;7:181–91

Recommendations for Patients at Risk of HF (Stage A)



Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

Recommendations for Cardio-Oncology (Continued)

COR	LOE	Recommendations
2a	B-NR	3. In patients with cardiovascular risk factors or known cardiac disease being considered for potentially cardiotoxic anticancer therapies, pretherapy evaluation of cardiac function is reasonable to establish baseline cardiac function and guide the choice of cancer therapy.[2,5–16]
2a	B-NR	4. In patients with cardiovascular risk factors or known cardiac disease receiving potentially cardiotoxic anticancer therapies, monitoring of cardiac function is reasonable for the early identification of drug-induced cardiomyopathy.[2,4,6,8]

Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

COR	LOE	Recommendations
1	B-NR	1. In first-degree relatives of selected patients with genetic or inherited cardiomyopathies, genetic screening and counseling are recommended to detect cardiac disease and prompt consideration of treatments to decrease HF progression and sudden death.[1,2]
2a	B-NR	2. In select patients with nonischemic cardiomyopathy, referral for genetic counseling and testing is reasonable to identify conditions that could guide treatment for patients and family members.[3,4]

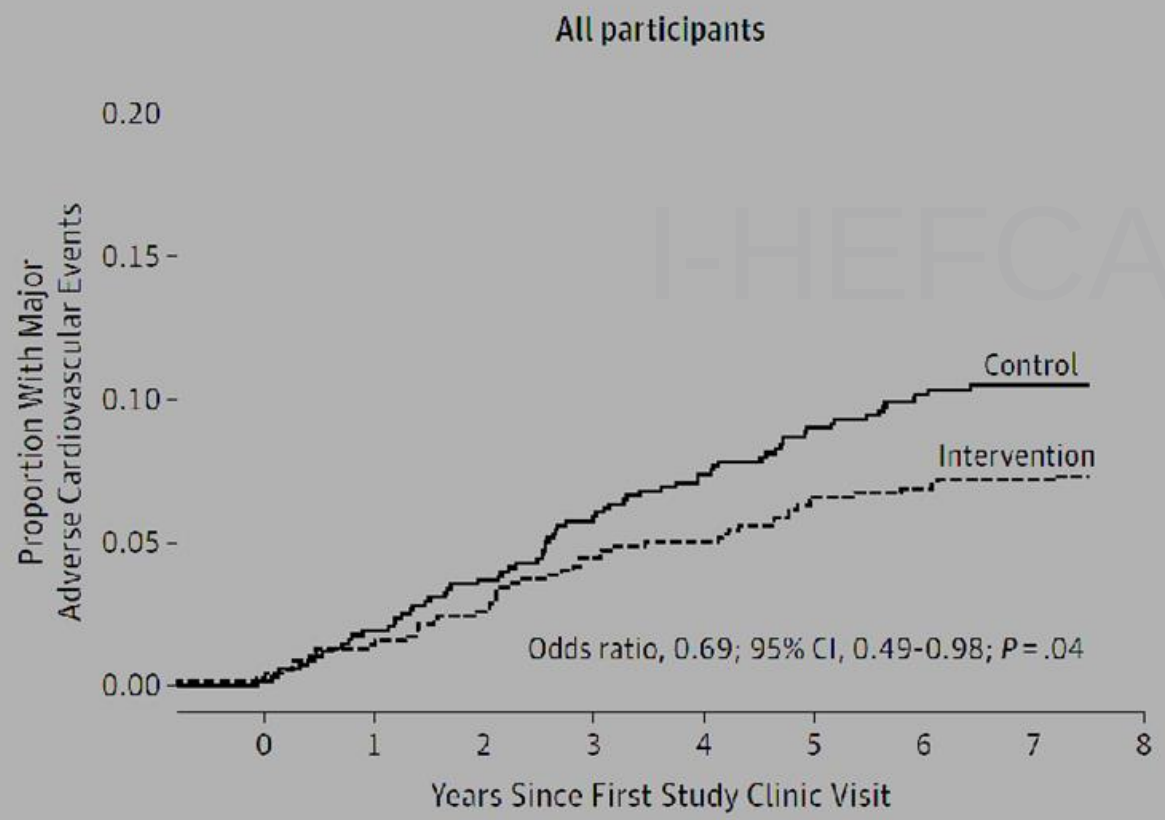
Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

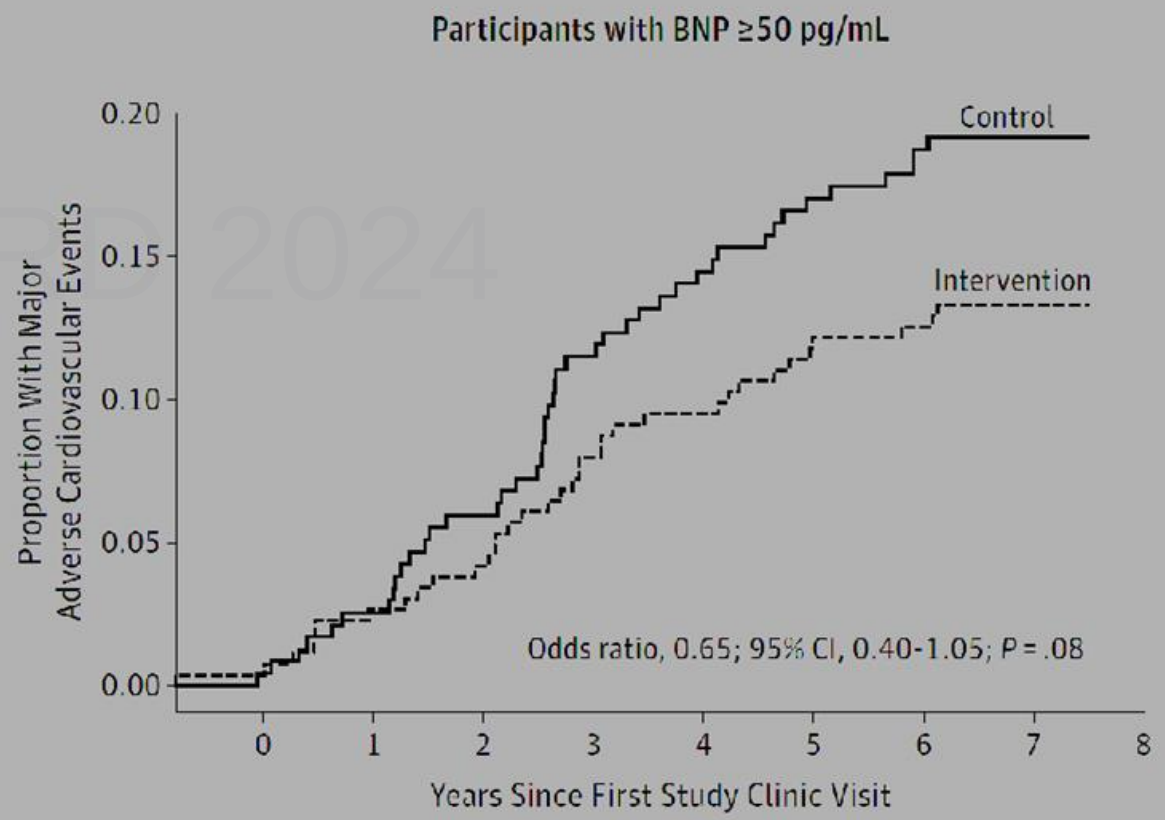
Risk of heart failure related to DPP4 inhibitors

Drug (trial)	Heart failure (%)	Nonstudy antidiabetic drugs	HR (95% CI) for Effect of DPP-4 Inhibitor
Sitagliptin (TECOS)	18	Metformin 81.6%; Insulin 23.2%;TZD 2.7%	1.00 (0.83–1.19) (in patients with no baseline HF: 0.96 [0.76–1.23]
Saxagliptin (SAVOR-TIMI 53)	12.8	Metformin 69.5%; Insulin 41.1%; TZD 6.0%	1.27 (1.07–1.51) (in patients with no baseline HF: 1.30 [2.03–2.65]
Alogliptin (EXEMINE)	27.9	Metformin 66.2%; Insulin 29.9%; TZD 2.4%	1.19 (0.90–1.58) (in patients with no baseline HF: 1.76 [1.07–2.90]
Omarigliptin (Protocol 018)	15.2	Metformin 77.4%; Insulin 34.9%; TZD 1.1%	0.60 (0.35–1.05) (no data for subgroup with no baseline HF); potential concern about competing risk
Linagliptin (CARMELINA)	27.2	Metformin 53.8%; Insulin 58.8%; Sulfonylurea 31.5%	0.90 (0.74-1.08) (in patients with no baseline HF: 0.92 [0.70-1.22]

Natriuretic Peptide–Based Screening and Collaborative Care for Heart Failure

The STOP-HF Randomized Trial





Ledwidge M, et al. JAMA. 2013;310:66-74

Risk scores to predict development of incident HF

Risk Score	Year Published
Framingham Heart Failure Risk Score	1999
Health ABC Heart Failure Score	2008
ARIC Risk Score	2012
PCP-HF	2019

Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

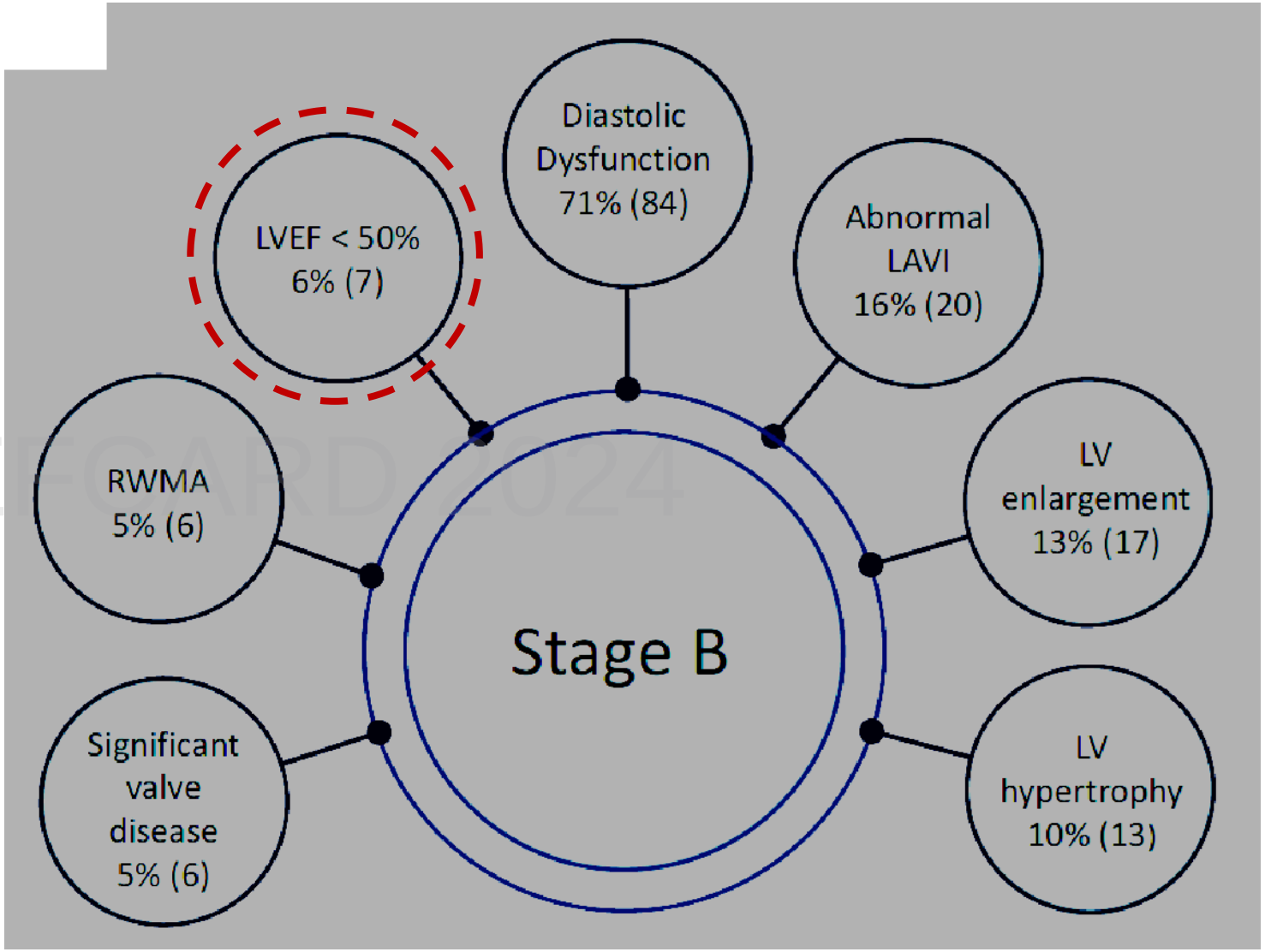
Prevention from developing stage C heart failure

Suggested Thresholds for Structural Heart Disease and Evidence of Increased Filling Pressures

Morphology	• LAVI ≥29 mL/m² • LVMI >116/95 g/m² • RWT >0.42 • LV wall thickness ≥12 mm
Ventricular systolic function	• LVEF <50% **≤40% for prevention** • GLS <16%
Ventricular diastolic function	• Average E/e′ ≥15 for increased filling pressures • Septal e′ <7 cm/s • Lateral e′ <10 cm/s • TR velocity >2.8 m/s • Estimated PA systolic pressure >35 mm Hg
Biomarker	• BNP ≥35 pg/mL* • NT-proBNP ≥125 pg/mL*

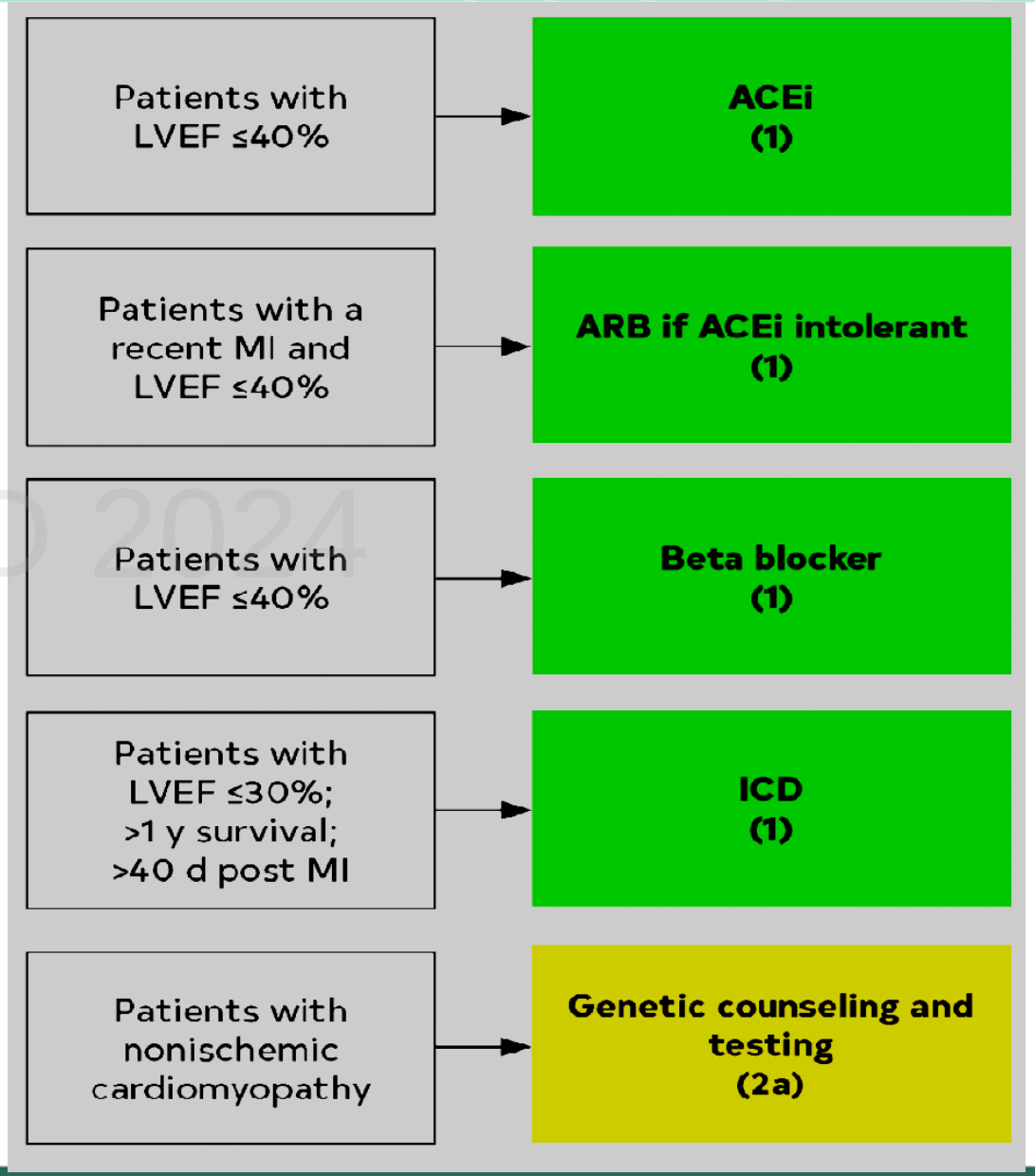
Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

Echocardiographic features of individuals in stage B heart failure



Young KA, et al. J Am Heart Assoc. 2022;11:e025519.

Recommendations for patients with pre-HF (stage B).



Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

Treatment with an ACE-I and a beta-blocker (preferably carvedilol) should be considered in cancer patients developing LV systolic dysfunction, defined as a 10% or more decrease in LVEF and to a value lower than 50%, during anthracycline chemotherapy.	**IIa**

McDonagh TA, et al. Eur Heart J 2021;00:1-128

Angiotensin Receptor–Neprilysin Inhibition in Acute Myocardial Infarction

Characteristic	Sacubitril–Valsartan (N=2830)	Ramipril (N=2831)
Left ventricular ejection fraction — %	36.4±9.3	36.6±9.6
Previous heart failure	0	0

Pfeffer MA, et al. N Engl J Med 2021;385:1845-55.

3: Harm	**B-R**	7. In patients with LVEF <50%, thiazolidinediones should not be used because they increase the risk of HF, including hospitalizations.[15]
3: Harm	**C-LD**	8. In patients with LVEF <50%, nondihydropyridine calcium channel blockers with negative inotropic effects may be harmful.[16,17]

Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

Take-home message

- **Heart failure prevention deserves high priority.**
- **Manage heart failure risk factors in accordance with guideline recommendation.**

Heidenreich PA, et al. Circulation. 2022;145:e895–e1032

Perspective for the non-cardiologist

In patients with T2DM and ASCVD or multiple risk factor for ASCVD or CKD, SGLT2 inhibitors are recommended to reduce the risk of heart failure hospitalization.

Perspective for the cardiologist

Morphology	• LAVI ≥29 mL/m² • LVMI >116/95 g/m² • RWT >0.42 • LV wall thickness ≥12 mm
Ventricular systolic function	• LVEF <50% **<40% for prevention** • GLS <16%
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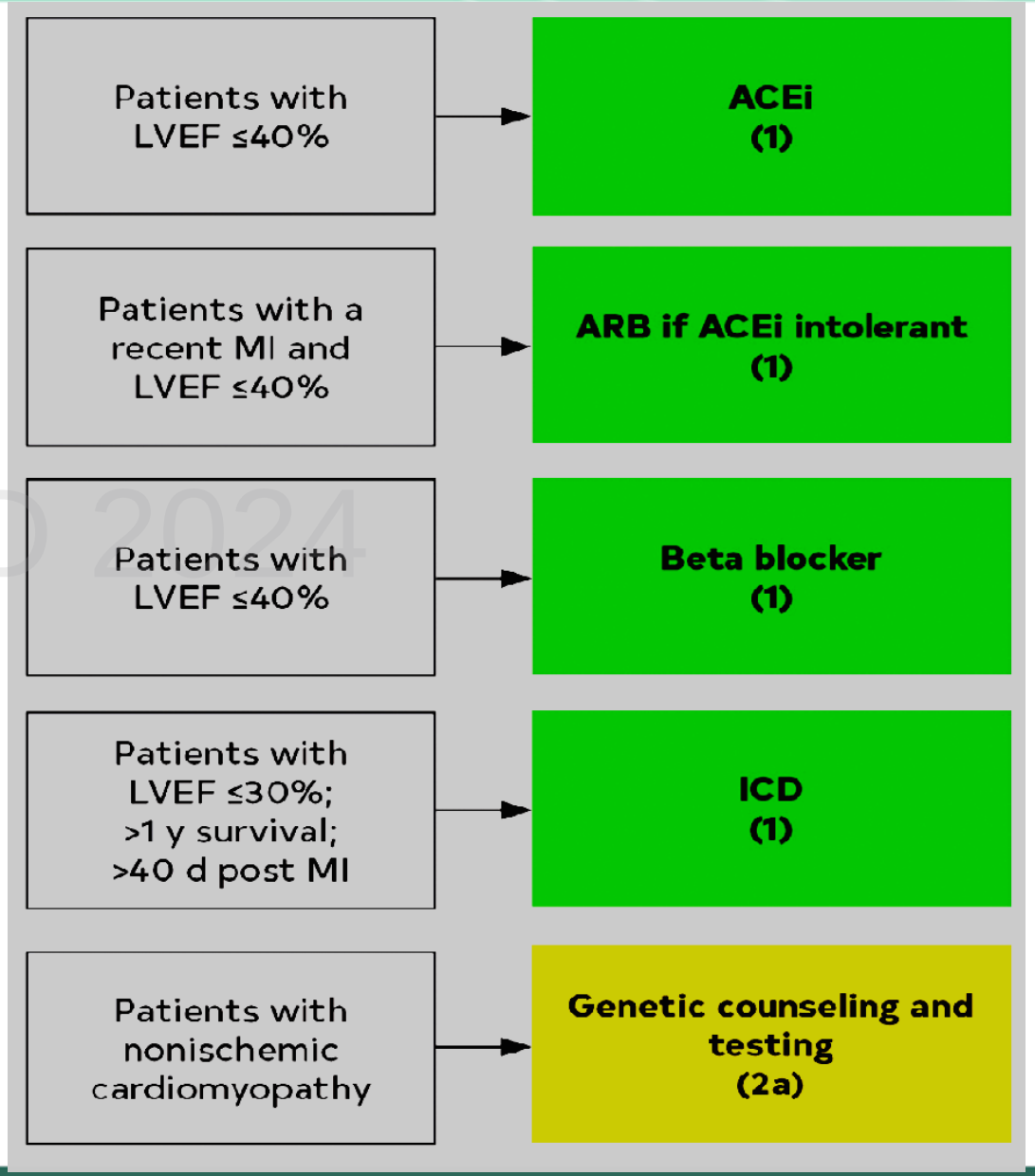
Perspective for the cardiologist



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