Prevention of Heart Failure (HFrEF and HFpEF)

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Disclosures:

• none
“A pathophysiological state in which an abnormality of cardiac function is responsible for the failure of the heart to pump blood at a rate commensurate with the requirements of the metabolising tissues” (E Braunwald, 1980)
Definition of Heart Failure

**STAGE A: At-Risk for Heart Failure**
- Patients at risk for HF but without current or previous symptoms/signs of HF and without structural/functional heart disease or abnormal biomarkers
- Patients with hypertension, CVD, diabetes, obesity, exposure to cardiotoxic agents, genetic variant for cardiomyopathy, or family history of cardiomyopathy

**STAGE B: Pre-Heart Failure**
- Patients without current or previous symptoms/signs of HF but evidence of 1 of the following:
  - Structural heart disease
  - Evidence of increased filling pressures
  - Risk factors and
    - increased natriuretic peptide levels or
    - persistently elevated cardiac troponin in the absence of competing diagnoses

**STAGE C: Symptomatic Heart Failure**
- Patients with current or previous symptoms/signs of HF

**STAGE D: Advanced Heart Failure**
- Marked HF symptoms that interfere with daily life and with recurrent hospitalizations despite attempts to optimize GDMT

Heidenreich PA, et al. *Circulation*. 2022
Definition of Heart Failure

**STAGE A:** At-Risk for Heart Failure
22.4%
- Patients at risk for HF but without current or previous symptoms/signs of HF and without structural/functional heart disease or abnormal biomarkers
- Patients with hypertension, CVD, diabetes, obesity, exposure to cardiotoxic agents, genetic variant for cardiomyopathy, or family history of cardiomyopathy

**STAGE B:** Pre-Heart Failure
34.1%
- Patients without current or previous symptoms/signs of HF but evidence of 1 of the following:
  - Structural heart disease
  - Evidence of increased filling pressures
  - Risk factors and
    - increased natriuretic peptide levels or
    - persistently elevated cardiac troponin in the absence of competing diagnoses

**STAGE C:** Symptomatic Heart Failure
23.6%
- Patients with current or previous symptoms/signs of HF

**STAGE D:** Advanced Heart Failure
0.2%
- Marked HF symptoms that interfere with daily life and with recurrent hospitalizations despite attempts to optimize GDMT

Heidenreich PA, et al. *Circulation*. 2022
**Definition of Heart Failure**

<table>
<thead>
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<th>STAGE A: At-Risk for Heart Failure</th>
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- **Patients at risk for HF but without current or previous symptoms/signs of HF and without structural/functional heart disease or abnormal biomarkers**

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- **Marked HF symptoms that interfere with daily life and with recurrent hospitalizations despite attempts to optimize GDMT**

Heidenreich PA, et al. *Circulation*. 2022
Prevalence of heart failure among US adults ≥20 years of age by sex and age (NHANES, 2015–2018)
At Risk for HF (Stage A)

- Patients with hypertension
- Optimal control of BP (1)
- Patients with type 2 diabetes and CVD or high risk for CVD
- SGLT2i (1)
- Patients with CVD
- Optimal management of CVD (1)
- Patients with exposure to cardiotoxic agents
- Multidisciplinary evaluation for management (1)
- First-degree relatives of patients with genetic or inherited cardiomyopathies
- Genetic screening and counseling (1)
- Patients at risk for HF
- Natriuretic peptide biomarker screening (2a)
- Patients at risk for HF
- Validated multivariable risk scores (2a)

Pre-HF (Stage B)

- Patients with LVEF ≤40%
- ACEi (1)
- Patients with a recent MI and LVEF ≤40%
- ARB if ACEi intolerant (1)
- Patients with LVEF ≤40%
- Beta blocker (1)
- Patients with LVEF ≤30%; >1 y survival; >40 d post MI
- ICD (1)
- Patients with nonischemic cardiomyopathy
- Genetic counseling and testing (2a)

Continue lifestyle modifications and management: treatment strategies implemented in Stage A, through Stage B
Lifestyle for Prevention of HF

1. Eat better
2. Be more active
3. Quit tobacco
4. Get healthy sleep – new in 2022
5. Manage weight
6. Control cholesterol
7. Manage blood sugar
8. Manage blood pressure
The American Heart Association’s “Life’s Simple 7”

Incidence rate per 1000 person-years

Ogunmokun O, et al. Life’s simple 7 and incident HF: MESA. JAHA. 2017
Biomarkers for Screening in HF

- BNP is a natriuretic peptide inherent to the heart failure syndrome.
- STOP-HF trial investigated the use of BNP in identifying and treating patients with elevated BNP (>50 pg/mL) if indicated.
- Patients with Stage A HF had significant reduction in clinical heart failure when identified by elevated BNP and treated with medical therapy.

Obesity and HF

• Obesity is a prevailing epidemic (38% of US population) and is associated with multiple CVD states

• Multiple studies demonstrate an association with obesity and the development of heart failure

• Obesity is a prevailing epidemic (38% of US population) and is associated with multiple CVD states
• Multiple studies demonstrate an association with obesity and the development of heart failure
• Multivariate analysis adjusted for risk factors demonstrated 5% (men) and 7% (women) increased risk of developing HF per unit BMI
• Exercise and weight loss interventions may be beneficial in reducing HF risk

Hypertension and heart failure

- Elderly patients recruited in the 1990s were enrolled in the Cardiovascular Heart Study and Health Aging and Body Composition Study.
- 11% of patients developed heart failure, with escalating risk over SBP > 120 mmHg.

Hypertension and heart failure

- SPRINT trial demonstrated substantial benefit with intensive blood pressure control (120 mmHg vs 140 mmHg) in reducing CV and all cause mortality in high-risk nondiabetic adults.
- Intensive BP control was associated with lower heart failure risk over 5 years (1.3% vs 2.1% p=0.002)

The SPRINT Research Group. NEJM. 2015.
Hyperlipidemia and HF

- Acute coronary syndromes are a common cause of HF
- High intensity statins have demonstrated benefit in reducing HF post-ACS. This benefit persists in high-risk groups (BNP>80)
- Metanlyses confirm benefit in this patient population

Lipoprotein(a) and HF

• Prior studies have suggested risk of HF associated with Lp(a)

• Effect appears to be associated with antecedent MI. When MI excluded from analyses, there is no difference in the incidence of HF in regard to Lp(a).

• As a result – prevention of MI and ACS is key!

• Historically: no cardiovascular benefit with diabetes medications

• Recent pharmacologic developments include SGLT2 inhibitors and GLP-1 RAs, both of which have demonstrated substantial ASCVD benefits in DM patients in cardiovascular outcomes trials
Diabetes and heart failure

• CV outcome trial for empagliflozin (EMPA-REG OUTCOMES) demonstrated substantial benefit in CV death, HF hospitalization and all cause mortality

• Significant benefit in reduction of heart failure hospitalization

Diabetes and heart failure

- Meta-analysis of three pivotal SGLT2 inhibitors demonstrate significant reduction in HF hospitalization for patients with ASCVD and trend towards reduction in high-risk patients.

- SGLT2 inhibitors now first line therapy for heart failure as well.

• Finerenone is a novel nonsteroidal mineralocorticoid receptor antagonist
• Recent trials demonstrated benefit in diabetic kidney disease in reducing CKD progression and CV events
• This agent appears to reduce the development of HF and hospitalization
Cancer and HF

- Heart disease and cancer share similar lifestyle and health risk factors
  - diabetes, obesity, hypertension, tobacco use
- Cancer death rates for middle aged US adults have declined from 1999 to 2017
- Heart disease rates for the same patient group have declined from 1999 to 2011 but increased from 2011 onwards. This is thought to be due to obesity, cardiometabolic diseases, and heart failure

Cancer and HF

• The next frontier of preventative cardiology may focus on treatment of cardiovascular risks in patients with comorbid cancer

• Growing evidence for surveillance and treatment benefit

**Symposium for Cardiovascular Disease Prevention**

Carvedilol for Prevention of Chemotherapy-Related Cardiotoxicity

Carvedilol blocks neural regulation of breast cancer progression in vivo and is associated with reduced breast cancer mortality.

Ryan D. Gil, Alexandra I., David M. Slt, Jillian G. Ba

Randomized Trial of Lisinopril Versus Carvedilol to Prevent Trastuzumab Cardiotoxicity in Patients With Breast Cancer

Maya Guglin, MD, PhD,a Jeffrey Krischer, PhD,b Roy Tamura, PhD,b Angelina Fink, MPH,c Lauren Bello-Matricaria, MPH,b Worta McCaskill-Stevens, MD,d Pamela N. Munster, MD,e

Orange County Symposium for Cardiovascular Disease Prevention
Prevention of Heart Failure

- Lifestyle optimization is the foundation for cardiovascular disease prevention, including heart failure
- Serum BNP is an effective screening and intervention strategy to treat patients with Stage A HF.
- New and exciting diabetes interventions provide future HF prevention strategies
- Cardiovascular disease prevention in cancer patients will be the next frontier of preventative cardiology