# HEART FAILURE

AMERICAN COLLEGE of CARDIOLOGY 75 ANNIVERSARY

## IDENTIFICATION OF **BIOMARKERS**

**1964** First reported biomarker work by Braunwald et al. used an early C-reactive protein assay to analyze serum from affected patients. Since then hundreds of biomarkers, including B-type natriuretic peptides, have been identified

**1990s** National Institutes of Health and the World Health Organization publish biomarker definitions

**2017** Latest ACC/AHA/HFSA Heart Failure Guideline incorporates biomarker testing into heart failure management

**2018** First-ever biomarker for the most common type of heart failure (HFpEF) is discovered

## **NEUROHORMONAL** ACTIVATION

**1992** Neurohormonal hypothesis suggesting that the degree of neurohormonal activation correlates with disease severity and clinical prognosis in heart failure is first proposed

## **INOTROPIC** THERAPIES

Inotropic agents like digoxin, dobutamine, norepinephrine, levosimendan, and others have evolved since the first introduction of foxglove into clinical practice in 1775 as a way to treat patients with systolic heart failure

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## FOUR PILLARS OF **PHARMACOLOGIC THERAPY**

### BETA BLOCKERS

**1975** First use of β-blockers for heart failure reported

**1997** β-blocker (carvedilol) first approved for heart failure

### ACE INHIBITORS, ARBS & ARNIS

**1987** Enalapril, an ACE inhibitor, shown to significantly reduce mortality in patients with severe heart failure

**2015** Sacubitril/valsartan approved by the FDA, after trials demonstrate ARNI therapy outperformed ACE inhibitors and ARBs in reducing death and hospitalizations, ushering in a new era in heart failure treatment

### MRAS

**1999** Spironolactone found to significantly reduce mortality and hospitalization in patients with HFrEF

**2003** Eplerenone found to reduce mortality and hospitalization in patients with heart failure after acute myocardial infarction

### SGLT2 INHIBITORS

**2022** Empagliflozin becomes the SGLT2 inhibitor approved for expanded indication for reducing risk of cardiovascular death and hospitalization for heart failure across all ejection fraction categories

ACC/AHA/HFSA Guideline for the Management of Heart Failure recommends SGLT2 inhibitors as one of four medication classes for heart failure treatment

**Today** Three SGLT2 inhibitors (empagliflozin, dapagliflozin and canagliflozin) are currently approved in the U.S. for reducing cardiovascular death or hospitalization for heart failure regardless of presence or absence of type 2 diabetes

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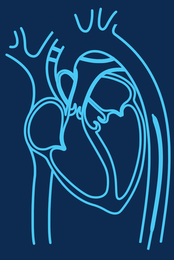
## CARDIAC RESYNCHRONIZATION THERAPY

**1990s**

Cardiac resynchronization therapy (CRT) emerges as an intervention that improves quality and quantity of life for heart failure patients

## TEMPORARY MECHANICAL SUPPORT



**1968**

Intra-Aortic Balloon Pump developed for mechanical support

**2008**

FDA approves first commercially available transvalvular ventricular assist device

## HEART TRANSPLANTATION

**1967** The first successful human heart transplant performed

**2018** United Network for Organ Sharing revises the long-time 3-tier heart allocation system into a 6-tier system with the goal of prioritizing the most unstable candidates and decreasing mortality

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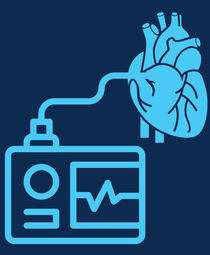
## DURABLE LEFT VENTRICULAR ASSIST DEVICE (LVAD)



**1980s** First implantation of left ventricular assist device (LVAD), primarily as a bridge to transplant

**1990s** FDA approves first LVAD for bridge to transplant

**2000s** Second generation LVADs approved for bridge to transplant and destination therapy

**2015** FDA approves third-generation continuous-flow LVADs

**2020s** Normothermic machine perfusion and normothermic regional perfusion (NRP) technologies increase orthotopic heart transplant donor pool by 20%

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