

Heart Failure: A Primer



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KEYWORDS

• Heart failure • Congestive heart failure • Pathophysiology • Self-management

KEY POINTS

- Heart failure is a clinical syndrome that results from impaired ventricular contractility and/or relaxation.
- Although many cases of heart failure are idiopathic, hypertension, diabetes mellitus, and coronary artery disease are common antecedents.
- Neurohormonal activation, including sympathetic nervous and renin-angiotensin-aldosterone system activation, and inflammation are common pathogenetic mechanisms that contribute to the progression of heart failure.
- The diagnosis of heart failure is made after careful history and physical examination and may require additional diagnostic tests, including echocardiography and laboratory tests.
- Pharmacotherapeutics for heart failure target neurohormonal activation and the consequences thereof and effective engagement in self-care is also important in overall heart failure management.

INTRODUCTION

Heart failure (HF) is a worldwide epidemic.¹ The common end point of highly prevalent cardiovascular disorders like hypertension² and coronary artery disease,³ HF currently affects more than 5 million Americans.⁴ HF is the most common reason for hospitalization and rehospitalization among older adults,⁵ and is the fastest growing cardiovascular disorder in the United States.⁶ There are more than 1 million hospital admissions⁷ and 3 million emergent visits for HF in the United States annually,⁸ which account for 20% of Medicare's hospital payments.⁹ With an increase in prevalence, the already large direct cost of HF is expected to triple in the next 20 years.¹⁰ Only 50% of patients live for 5 years after the diagnosis of HF,¹¹ and those living with HF experience significant symptom burden, functional limitations,¹² and decreased health-related quality of life (HRQOL).¹³ Thus, despite decades of advances in therapeutics and knowledge of HF pathogenesis,¹⁴ there are considerable opportunities to

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reduce both the national and personal burdens of HF.¹⁵ This article reviews the definition, common causal and pathogenic mechanisms, diagnosis, and treatment of chronic HF.

HEART FAILURE DEFINED

HF is a complex and multisystem clinical syndrome resulting from impaired ventricular contractility and/or relaxation.¹⁶ HF generally results from cardiac muscle dysfunction and is characterized by ventricular dilatation and/or hypertrophy, venous congestion, and inadequate oxygen delivery.¹⁷ There are several subclassifications of HF based on left ventricular ejection fraction (LVEF),¹⁶ which are presented in **Table 1**. The severity of HF is often classified using the New York Heart Association (NYHA) functional classification, which stratifies activity limitations and symptom provocation. Specifically, HF and the treatment thereof can result in no ordinary physical activity limitations or symptoms (NYHA class I); slight limitations to physical activity, no symptoms at rest, but HF symptoms with ordinary physical activity (NYHA class II); comfort at rest with marked limitations to physical activity and HF symptoms with less than ordinary activity (NYHA class III); or the inability to engage in any physical activity without HF symptoms or HF symptoms at rest (NYHA class IV).¹⁸ The American College of Cardiology (ACC) and American Heart Association (AHA) also have a rubric for staging the progressive nature of HF: high risk for the development of HF without structural abnormalities or symptoms (stage A), structural abnormalities without prior or current HF signs or symptoms (stage B), structural abnormalities with prior or current HF symptoms (stage C), and refractory HF requiring advanced therapies (stage D).¹⁹ Collectively, these definitions are used to grade the current impact of HF and its treatment on patients' physical activity as well as to comment on the stage of HF progression.

COMMON CAUSAL PATHWAYS TO HEART FAILURE

Hypertension is a common antecedent to HF.^{20,21} In response to increased pressure load and reduced compliance, the left ventricle is altered in both structure and form to accommodate hypertension²² in HF in general and in HF with preserved ejection fraction in particular.²³ Diabetes mellitus is also a common antecedent to HF.^{24,25} Via metabolic disturbances, fibrosis, small vessel accumulation of advanced glycation end products, impaired calcium homeostasis, and insulin resistance, diabetes mellitus is associated with both systolic and diastolic ventricular dysfunction.²⁶ Coronary artery disease is another common antecedent to HF, because it often results in the loss of functioning cardiomyocytes in addition to ventricular dilatation and fibrosis.²⁷ There are numerous other causes of HF, including multiple cardiomyopathies (eg,

LVEF (%)	Classification	Related Terms
≤40	HFrEF	Systolic heart failure
41–49	Borderline HFpEF, or previous HFrEF that has improved to HFpEF	—
≥50	HFpEF or previous HFrEF that has improved to HFpEF	Diastolic heart failure

Abbreviations: HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction.

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