

## Heart Failure Prevention, Diagnosis, and Management

Heart failure is a complex, progressive disease.<sup>1</sup> Despite advances in treatment, about half of patients with heart failure die within 5 years of diagnosis.<sup>2</sup> Any condition that affects the function of the heart and impairs ventricular filling or ejection can cause heart failure (see Sidebar).<sup>3</sup> Onset may be acute (eg, after myocardial infarction) or insidious (eg, with progressive coronary artery disease).<sup>3</sup>

The American Heart Association (AHA) estimates that 6.5 million persons in the United States aged 20 or older have heart failure.<sup>4</sup> The prevalence will only increase as the population continues to age and with improved survival after myocardial infarction; by 2030, an estimated 8 million Americans will have heart failure.<sup>4</sup>

Heart failure frequently presents with nonspecific signs and symptoms. Consequently, diagnosis may be delayed, leading to worse outcomes. Natriuretic peptides have been in use for management of patients with heart failure. To help prevent or detect heart failure, current guidelines now recommend measurement of natriuretic peptides as a screening tool.<sup>5,6</sup>

This newsletter will discuss the role of natriuretic peptides and other biomarkers in the prevention, diagnosis, and management of heart failure, and focus on the 2017 update of the American College of Cardiology/American Heart Association/Heart Failure Society of America (ACC/AHA/HFSA) recommendations for the use of biomarkers in heart failure.<sup>5</sup>

### Biomarkers in the Prevention, Diagnosis, and Management of Heart Failure

The 2013 ACC/AHA/HFSA guidelines were updated in 2017 to clarify the use of several biomarkers in patients at risk for heart failure, and those with suspected or known heart failure.<sup>5,6</sup>

#### Natriuretic Peptides

In response to stretching caused by increased ventricular blood volume and other causes of myocardial stress, cardiomyocytes in the heart ventricles release a natriuretic peptide called proB-type natriuretic peptide (proBNP).<sup>1</sup> In circulation, proBNP is cleaved into smaller peptides, including BNP and N-terminal proBNP (NT-proBNP). BNP is an active hormone that regulates fluid balance and blood pressure, whereas NT-proBNP has no established bioactivity. Either can be used for distinguishing heart failure from other causes of dyspnea in the emergency department.<sup>1</sup>

The ACC/AHA/HFSA guidelines now recommend natriuretic peptide–screening for patients at risk for heart failure who do not have cardiac disease or systolic dysfunction at baseline (eg, those with hypertension or diabetes mellitus).<sup>5</sup> Elevated BNP and NT-proBNP have been associated with a higher risk of heart failure and cardiac events.<sup>6</sup>

For disease management, the 2017 guidelines recommend measuring natriuretic peptide levels in patients hospitalized for decompensated heart failure.<sup>5</sup> Admission levels of natriuretic peptide are useful for predicting the hospitalization course, and predischarge levels are useful for establishing a postdischarge prognosis. Higher



### Risk Factors and Causes of Heart Failure<sup>3</sup>

Any medical condition that causes damage to the heart can increase the risk of heart failure. Common risk factors include

- Arrhythmia
- Cardiomyopathy
- Congenital heart disease
- Coronary artery disease
- Diabetes
- History of alcohol abuse
- History or family history of cardiomyopathy
- History of receiving drugs that can damage heart muscle (eg, some chemotherapy drugs)
- History of rheumatic fever
- Hypertension
- Kidney disease
- Metabolic syndrome
- Myocardial infarction
- Obesity
- Pneumonia/influenza
- Tobacco and illicit drug use

natriuretic peptide levels may suggest a worse prognosis and the need for more intensive monitoring and therapy.<sup>5</sup> Unchanged from the 2013 guidelines is using natriuretic peptide levels to monitor patients with chronic heart failure. Increasing levels correlate with increasing disease severity.<sup>6</sup>

Importantly, natriuretic peptide levels are also elevated in a variety of disorders *not* associated with heart failure (eg, liver cirrhosis and hyperthyroidism). Consequently, results must be interpreted in light of additional data, including the patient's clinical signs and symptoms.<sup>7</sup>

### Cardiac troponin (cTN) I and T

Cardiac troponin (cTN) protein markers are useful in patients with acute decompensated heart failure. The cTN complex is integral to skeletal and cardiac muscle contraction and consists of 3 regulatory proteins.<sup>1</sup> Of the 3, cTN I and cTN T are sensitive and specific markers of damage to heart muscle.<sup>1</sup> Elevated cTN I and cTN T levels are associated with a higher risk of death and worse clinical outcomes. Consequently, the 2017 guidelines recommend measuring levels of these proteins to establish a prognosis for patients presenting with acute decompensated heart failure on hospital admission.<sup>5</sup>

### Biomarkers of Myocardial Fibrosis

Galectin-3, soluble ST2 receptor, and high-sensitivity cardiac troponin are indicators of myocardial fibrosis.<sup>1</sup> Elevated levels are predictive of hospitalization and death in patients with heart failure.<sup>1</sup> Their prognostic value is additive to that of natriuretic peptide levels, and the 2017 guidelines indicate their measurement may be considered for additive risk stratification in patients with chronic heart failure.<sup>5</sup>

### How the Laboratory Can Help

Quest Diagnostics offers biomarker testing for the diagnosis, prognosis, and management of heart failure, as well as for evaluation of heart failure risk. Additional information about heart failure biomarker testing is available at [QuestDiagnostics.com/home/physicians/testing-services/condition/cardiovascular/heartfailure](http://QuestDiagnostics.com/home/physicians/testing-services/condition/cardiovascular/heartfailure).

Quest Diagnostics also offers a comprehensive portfolio of advanced cardiovascular testing, including advanced lipid testing, inflammatory markers, metabolic markers, and genetic tests. These tests help provide a complete picture of a patient's cardiovascular health and aid in managing residual cardiovascular risk. Information about cardiovascular testing is available at [QuestDiagnostics.com/home/physicians/testing-services/condition/cardiovascular.html](http://QuestDiagnostics.com/home/physicians/testing-services/condition/cardiovascular.html).

### References

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