### References


The 2017 guideline update made clear, specific recommendations for the use of biomarkers using evidence from recent clinical studies.

The clinical practice guidelines are categorized by Class of Recommendation (COR*) and Level of Evidence (LOE†).

*Reflects the strength of recommendation: I = strong; IIa = moderate; IIb = weak; III = no benefit or harm.
†Reflects the quality of evidence: A = high quality; B = moderate quality; C = limited data or expert opinion.

### Biomarker assessments for patients with heart failure

An overview of recommendations from the 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure
Biomarker-based screening is now recommended for the prevention of HF

### Biomarker-based Screening for Prevention: Recommendation

<table>
<thead>
<tr>
<th>Biomarkers: Recommendation for Prevention of HF</th>
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<tbody>
<tr>
<td><strong>COR</strong></td>
</tr>
<tr>
<td>IIa</td>
</tr>
</tbody>
</table>

In a large-scale unblinded single-center study (STOP-HF [The St Vincent’s Screening to Prevent Heart Failure]), patients at risk of HF (identified by the presence of hypertension, diabetes mellitus, or known vascular disease [eg, stage A HF]), but without established left ventricular systolic dysfunction or symptomatic HF at baseline, were randomly assigned to receive screening with BNP testing or usual primary care. Intervention-group participants with BNP levels of ≥ 250 pg/mL underwent echocardiography and were referred to a cardiovascular specialist who decided on further investigation and management. All patients received further coaching by a specialist nurse who emphasized individual risk and the importance of adherence to medication and healthy lifestyle behaviors. BNP-based screening reduced the composite endpoint of asymptomatic left ventricular dysfunction (systolic or diastolic) with or without newly diagnosed HF. Similarly, in another small, single-center RCT, accelerated up-titration of renin-angiotensin-aldosterone system antagonists and beta blockers reduced cardiac events in patients with diabetes mellitus and elevated NT-proBNP levels but without cardiac disease at baseline. Developing a standardized strategy to screen and intervene in patients at risk of HF can be difficult because of different definitions of HF risk, heterogeneity of prevalence in different populations, variable duration until clinical HF or left ventricular dysfunction develops, and variable interventions for risk factor modification or treatment. Further studies are needed to determine cost-effectiveness and risk of such screening, as well as its impact on quality of life (QoL) and mortality rate.

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**Biomarkers Indications for Use.**

- **BNP or NT-proBNP** (COR I)
- **BNP or NT-proBNP and cardiac troponin** (COR I)
- **Pre-discharge BNP or NT-proBNP** (COR Ia)

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**BNP and NT-proBNP Biomarkers are widely accepted for HF diagnosis and management**

**BNP and NT-proBNP Biomarkers**

<table>
<thead>
<tr>
<th>Marker</th>
<th>Biology</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNP and NT-proBNP</td>
<td>Increased concentrations of these NP biomarkers occur in response to myocardial stretch that results from increased volume or pressure. Because they track similarly, either may be employed so long as they are not used interchangeably.</td>
<td>HF</td>
</tr>
<tr>
<td>cTn</td>
<td>Concentrations of cTn are increased with myocardial necrosis; however, it is not specific to acute coronary syndrome and can be increased in any condition that results in myocardial damage.</td>
<td>MI, HF, CAD</td>
</tr>
<tr>
<td>Galectin-3</td>
<td>Increased expression occurs in activated macrophages, which stimulates myocardial remodeling through fibroblast proliferation and collagen deposition. Thus, it represents a link between inflammation and fibrosis.</td>
<td>HF</td>
</tr>
<tr>
<td>ST2</td>
<td>An IL-1 receptor family member that is expressed as a transmembrane (ST2L) and soluble isoform (sST2). Increased plasma sST2 concentrations lead to myocardial death and tissue fibrosis.</td>
<td>MI, HF</td>
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**Other biomarkers of myocardial injury or fibrosis** (COR IIb)

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**Other biomarkers of myocardial injury or fibrosis** (COR IIa)

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**BNP, B-type natriuretic peptide; CAD, coronary artery disease; cTn, cardiac troponin; HF, heart failure; IL, interleukin; MI, myocardial infarction; NT-proBNP, N-terminal pro-B-type natriuretic peptide; ST2, suppressor of tumorigenicity 2.**