Proteomic Biomarkers of Heart Failure

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KEYWORDS

• Biomarkers • Heart failure • Prognosis • Diagnosis • Proteomics

KEY POINTS

- Heart failure is associated with significant morbidity and mortality.
- Biomarkers are commonly used for diagnostic and prognostic purposes.
- Protein-based biomarkers have been identified to aid clinicians in the early diagnosis of heart failure and provide added information for prognosis.
- Proteomics is an ever-expanding field that uses techniques to measure a wide range of proteins and peptides in the search to identify potential protein biomarkers.

INTRODUCTION

It is estimated that in excess of 20,000 protein-coding genes are responsible for the presence of more than 1 million proteins found in biological matrices.[1] The measurement of these proteins, commonly in plasma, serum, urine, saliva, and tissue samples,[2] has provided critical advancements in medical science through the development of diagnostic and prognostic assays for patients presenting with, or at risk of, a multitude of diseases.[3] The use of protein measurements has been particularly beneficial for the assessment of cardiovascular disease, with the notable inclusion of natriuretic peptides and troponin isoforms in clinical decision making for heart failure (HF)[4] and acute coronary syndromes (ACS),[5] respectively. Clinical measurements of endogenous biological substances, such as proteins, lipids, and metabolites, are commonly referred to as biomarkers and provide pathophysiologic information through an associative or direct mechanistic interaction with the diseased system, organ, or tissue.[6] The relationships of protein biomarkers with disease allow physicians to assess the presence, severity, and/or prognosis of a condition with improved precision and accuracy.[7]

The progression in medical diagnosis and treatment of HF has been heavily influenced by the inclusion of protein biomarker analyses, with measurement of natriuretic peptides commonly used in hospitals worldwide.[8] HF is a major worldwide epidemic associated with high morbidity, mortality, and health care costs affecting more than 23 million people, especially those aged 65 years or older[9]; therefore, any improvements in diagnosis, prognosis, and therapeutic monitoring using protein measurements provide direct improvements in patient care and outcome, as well as economic burden. Difficulties in HF diagnoses exist because of the multifactorial pathophysiology (eg, cardiac stress and injury, neurohormonal activation, and endothelial congestion), and because the signs and symptoms may not arise during early stages of the disease.[10,11] Current guidelines suggest that patients presenting with suspected HF should

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