

# The promise of glycoproteomics for studying cardiovascular disease

## Abstract

The potential of glycoproteomics for analyzing proteins associated with cardiovascular diseases are discussed.

**Keywords:** glycoproteomics, extracellular matrix, myocardial infarction

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## Editorial

Protein glycosylation, an enzyme-directed site-specific process, is one of the most common co-translational and post-translational modifications.<sup>1</sup> Glycoproteins modulate multiple biological processes, including cell adhesion and migration, signal transduction, and cell-cell communication.<sup>2,3</sup> Despite its widespread importance, glycoproteomics is not commonly used for studying cardiovascular disease compared to other diseases, such as cancers and diabetes. Glycoproteomics has the potential to be a powerful tool for analyzing proteins associated with cardiovascular diseases, as discussed below.

- i. Glycosylation alters protein function by influencing protein folding, activity, stability, and distribution.<sup>4</sup> Glycosylation is increasingly recognized for its importance in modulating cardiomyocyte function and survival.<sup>5</sup>
- ii. Glycoproteins are the major components of the cardiac extracellular matrix, including structural and non-structural proteins that play key roles in cardiovascular disease development.<sup>6</sup> For example, thrombospondin, tenascin-C, and periostin are 3 nonstructural extracellular matrix glycoproteins that modulate cardiac remodeling after myocardial infarction.<sup>7-9</sup>
- iii. Since most cell surface and secreted proteins, including extracellular matrix proteins, are glycosylated, glycoproteomics is a useful enrichment strategy for the study of extracellular proteins.<sup>10-12</sup> Due to the extracellular location, these proteins are readily detected on cell surface or released into circulation, allowing them to serve as potential biomarkers and logical drug targets.<sup>13</sup> Therefore, glycoproteomics is a good approach for biomarker discovery.
- iv. Glycoproteomics greatly reduces the sample complexity by focusing on glycosylated peptides instead of all protein peptides, which greatly improves the odds of the detecting low abundant proteins.<sup>14,15</sup> Glycoproteome enrichment coupled with targeted mass spectrometry analysis, such as selected reaction monitoring (SRM), further improves the sensitivity of mass spectrometry-based assays.<sup>16</sup>

Glycosylation is a highly abundant modification crucial for the regulation of protein function, including proteolytic cleavage by enzymes and intra-protein interaction. Glycoproteomics is a logical approach to target specific subproteome with improved sensitivity for low abundant proteins. Therefore, glycoproteomics presents a new direction in methods that allow proteins associated with cardiovascular disease to be assessed for potential use as biomarkers or drug targets.

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## Conflict of interest

The author declares no conflict of interest.

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