The promise of glycoproteomics for studying cardiovascular disease

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

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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. Glycoproteins modulate multiple biological processes, including cell adhesion and migration, signal transduction, and cell-cell communication. 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. Glycosylation is increasingly recognized for its importance in modulating cardiomyocyte function and survival.

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. For example, thrombospondin, tenascin-C, and periostin are 3 nonstructural extracellular matrix glycoproteins that modulate cardiac remodeling after myocardial infarction.

iii. Since most cell surface and secreted proteins, including extracellular matrix proteins, are glycosylated, glycoproteomics provides a useful enrichment strategy for the study of extracellular proteins. 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. 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. Glycoproteome enrichment coupled with targeted mass spectrometry analysis, such as selected reaction monitoring (SRM), further improves the sensitivity of mass spectrometry-based assays.

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.

References


