Biomarker Potential of Plasma Protein N-glycans in Coronary Artery Disease

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Introduction: Coronary artery disease (CAD) is the most common cardiovascular disease (CVD), resulting from chronic inflammation of the coronary arteries due to the formation of atherosclerotic plaques, and its presence is a significant marker of adverse cardiovascular events. A growing body of research suggests that alterations in protein N-glycosylation are involved in the development of CVD through various mechanisms and have significant biomarker potential because of their sensitivity to changes that occur in the organism during inflammation-related conditions such as CVD[1-3]. Our aim was to determine whether the N-glycome of total plasma proteins is associated with CAD, because N-glycans are known to alter the effector functions of proteins, which may enhance their inflammatory response in CAD.

Patients and Methods: In this study, we analysed the N-glycome of plasma proteins isolated from patients who underwent coronary angiography and classified into patients with confirmed coronary atherosclerosis and patients with clean coronaries. Proteins were denatured and enzymatically deglycosylated, and the released and fluorescently labelled N-glycans were analysed by ultra-high performance liquid chromatography based on hydrophilic interactions with fluorescence detection (HILIC-UHPLC-FLR) (**Figure 1**). Because previous studies have shown evidence of sexual dimorphism in CVD and significant sex differences in the association of N-glycans with CVD risk, we performed sex-stratified analysis of plasma N-glycans.

Results: The results showed significant differences in plasma N-glycome composition in CAD. Lower abundance of complex biantennary galactosylated N-glycans with core fucose and, conversely, a higher abundance of highly branched (tri- and tetra-antennary) sialylated N-glycan structures with terminal fucose was shown to be associated with CAD.

Conclusion: The obtained chromatograms shed light on the composition of plasma protein N-glycans in CAD and provided new insights into N-glycosylation changes in CAD. Overall, because of their sensitivity to changes that occur in an organism, protein N-glycosylation emerges as a significant factor in CAD and holds potential as a diagnostic tool, with glycan-based biomarkers showing promise for predicting cardiovascular health.
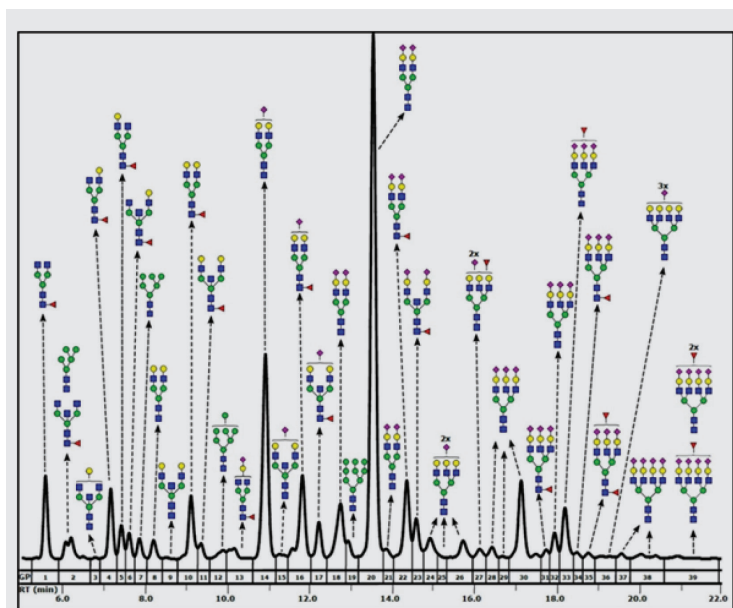

FIGURE 1. Representative chromatogram of 2-AB labelled plasma protein N-glycans separated by HILIC–UHPLC-FLR. The integration areas together with a major structure presented in each glycan peak are shown.

LITERATURE ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||

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