Purification and glycosylation analysis of plasma proteins using 96-well monolithic plates

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Glycosylation is the process of attaching sugar molecules (glycans) to proteins during and after their synthesis. This intricate procedure influences the structure, proper folding, and function of glycoproteins. Glycans play a crucial role in facilitating protein interactions on cell surfaces, ensuring proper cell signaling and recognition. Glycosylation is a result of an interplay of genetic and environmental factors. Irregular glycosylation patterns have been linked to various diseases, including congenital glycosylation disorders, infectious diseases, autoimmune conditions, inflammatory diseases, and cancer. These patterns hold significant potential as diagnostic and prognostic biomarkers for diseases. To explore glycosylation patterns in large-scale human populations and clinical studies, extensive efforts have been directed toward developing efficient methods for glycan analysis across numerous samples, known as high-throughput methods. Chromatographic monoliths have emerged as valuable tools for purifying individual plasma glycoproteins, enhancing sample preparation throughput due to their unique chromatographic properties. Monolithic supports in a 96-well plate format have been successfully employed for the high-throughput purification of plasma glycoproteins. Subsequent glycosylation analysis has been performed in population studies, genome-wide association studies, and biomarker discovery. Drawing on a decade of experience with monolithic plates, we will present insights and findings from our studies in the realm of high-throughput glycosylation analysis.