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Comparison of two methods for enriching serum peptides: on-chip fractionation and acetonitrile precipitation

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Blood serum, as a highly complicate mixture of proteins, metabolites and lipids, is a rich source of potential biomarkers for a lot of diseases and conditions. Although the distribution of protein abundance in serum proteome is across at least seven orders of magnitude, a relatively small number of proteins make up most of the total protein pool, such as albumin which occupies over 50% of serum protein weight. Serum peptides, as potential biomarkers in blood, can be concentrated and then detected using mass spectrometry by depletion of abundant proteins. Acetonitrile (ACN) precipitation, as a reproducible and easily parallelized method, is extensively used for enriching serum peptides. On-chip fractionation method established in our group uses nano silica-based thin film to trap serum peptides by size exclusion, electrostatic force and hydrophobicity. The objective of this study was to compare the above two methods in several respects: efficiency, reproducibility, simplicity and quickness. Ten serum samples from multiple myeloma patients were used and each sample had three replicates. We identified 44 unique peptides by on-chip fractionation and 33 unique peptides by ACN precipitation, but only 16 unique peptides are in common. Compared with ACN precipitation, nano-chip can enrich serum peptides with more polarity. In addition, the coefficients of variation in peak intensities are 10% and 18% respectively for on-chip fractionation and ACN precipitation. Our results show that on-chip fractionation is a good complementary supplement of the current ACN precipitation method for the biomarker study of serum peptides.

Biography

Yaojun Li has completed his Ph.D. at the age of 28 years from Peking Union Medical College (Beijing, China) and postdoctoral studies from Hong Kong University of Science and Technology. He is continuing his postdoctoral studies on peptidomic cancer biomarker in The Methodist Hospital Research Institute. He has good training on proteomics study, and a new paper related to absolute quantitative phosphoproteomics was just published on Molecular and Cellular Proteomics in 2012.

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