Abstract of Presentation

Presentation Title:

Glycoproteomic Profiling of Human Serum Proteome: Novel Approaches for Carbohydrate-targeting Tumor Marker Discovery

Abstract :

Identification and characterization of disease-associated alterations of glycans on cell surface or in body fluids are the central aims of the emerging glycoproteomics projects. Since the aberrant glycosylation is a common feature of cancer cells and certain changes of glycan structures are well-known serum tumor markers, we are focusing on development of new screening techniques to identify carbohydrate-targeting tumor markers.

The first topic I'd like to introduce is Lectin-coupled ProteinChip system with SELDI-TOF mass spectrometry. We immobilized several O-type glycan-recognizing lectins to ProteinChip arrays and analyzed 20 serum samples. From SELDI-TOF MS analyses, we identified 41 protein peaks showing significant difference ($p < 0.05$) in the peak level between lung cancer and normal samples. Among them, we found ApoC-III protein had frequent loss of Neu5Ac (α2, 6) Gal/GalNAc structure in lung cancer patients' sera using MALDI-QIT-TOF MS^3 analysis. Our ProteinChip technology using multiple lectins allows high-throughput scanning of cancer-associated aberrant glycosylations.

The following topic is isotopic glycopeptidase elution from lectin column chromatography (IGEL) system that we recently developed. This method is based on glycan structure-specific enrichment of glycopeptides by lectin column chromatography and site-directed tagging of N-glycosylation sites by $H_2{}^{18}O$. The combination of IGEL with 8-plex iTRAQ stable isotope labeling enabled us not only to quantitatively compare glycan structures on serum proteins from 8 individuals but also to identify those glycosylation sites in a single analysis of LC/MS/MS. Indeed we've already identified lots of N-glycosylation sites on multiple serum proteins, including known tumor marker CEA, from lung cancer samples simultaneously with the information of glycan structures.

Our latest approaches for tumor marker discovery, as well as potential of glycoproteomics in medical science will also be discussed.