Identification of Novel Biomarker Candidates from Serum of Prostate Cancer Patients Using Agarose-Based Two Dimensional Fluorescence Difference Gel Electrophoresis (Agarose 2D-DIGE)

Introduction and Objective: Serum proteomics is a promising tool to discover novel biomarker candidates. Although advanced technologies of proteomics are progressing, serum proteomics is still challenging. In this study, we tried to find biomarkers of prostate cancer by our unique proteomic approach.
Materials and Methods: For proteomic analysis, 4 paired serum samples from 4 prostate cancer patients and 4 healthy male controls were analyzed with agarose based two dimensional fluorescence difference gel electrophoresis (agarose 2D-DIGE) which used agarose gel instead of acrylamide gel for the first isoelectric electrophoresis to improve analysis precision for high molecular mass proteins. Abundant albumin and IgG were removed from serum, and then residual proteins in cancer and normal patients' serum were labeled with different fluorescent dyes. Mixture of paired serum was analyzed with agarose 2D-DIGE. The differentially expressed protein-spots were identified with tandem mass spectrometry.
Results: The 2D-DIGE analysis showed that 14 protein-spots increased and 6 spots decreased in prostate cancer patients. From 16 protein spots we successfully identified 11 proteins. To validate our proteomic analysis, we quantified the expression of a representative protein with ELISA in another series of serum samples from 48 prostate cancer patients and 24 age-matched healthy male controls. We chose apolipoprotein A1 (Apo A1), for which an ELISA was commercially available, as a representative protein. Apo A1 expression in serum was 625.7 mg/dL and 225.2 mg/dL in control and cancer patients, respectively ($p<0.01$).
Conclusions: Serum proteomics with the agarose 2D-DIGE revealed that 11 proteins were differentially expressed between prostate cancer patient and healthy control serum. These proteins might be promising novel candidates for a prostate cancer biomarker. Further investigations should be warranted.